Aalto University
School of Business

"NEVER IS GOING TO BE AS CALM AS NOW" – HOW DO LARGE FINNISH ORGANIZATIONS ADAPT THEIR DIGITAL STRATEGIES TO THE FAST-CHANGING BUSINESS ENVIRONMENT?

Master's Thesis
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Abstract

There are more developments and disruptions in technology and business models than ever before. To react to and benefit from these changes, organizations have created digital strategies. However, solely implementing a long-term digital strategy can cause falling behind in technology and competition if the organization is not able to react to the fast changes in business environment. The purpose of this thesis is to study how large organizations adapt their digital strategies in order to simultaneously implement long-term digital strategy and react fast to the changes in business environment. The previous research of digital strategy's adaptation to the fast changes in business environment and capabilities it requires from organizations is still scarce.

This thesis is conducted as a multiple case study of 11 large Finnish organizations which have shown interest towards digitalization. One person participating to digital strategy or strategy work was interviewed from each organization meaning in total 11 semi-structured interviews. The data was analyzed with Gioia method to bring rigor to the data analysis and to look for the themes in data with a consistent way.

Findings of the study present that organizations adapt to the changes in environment by adapting their digital strategies and by following changes in environment, addressing new opportunities, and transforming the organization in ways they did not use with traditional business. This thesis contributes to the previous research by extending the literature of digital strategy and looking dynamic capabilities theory from the perspective of digital strategy. This study suggests that digital strategy develops through three steps: first digitalization is mentioned in strategy, secondly organizations have a digital strategy or transformation program, and finally digitalization is embedded to business strategy. To follow changes effectively, organizations do it as a part of their strategy processes but also use external partners, internal idea collection processes, or specified teams to support following changes. Addressing new opportunities differ from traditional product development and is aimed to be faster and more agile. Opportunities are addressed through three steps which include planning the pilot, implementing it, and finally ending or scaling it to a product. To implement the pilots, organizations engage customers and combine capabilities relating to business, IT and software development, and new knowledge. To support adaptation to the changes in environment, organizations have made changes to their structures, built new digital competences, used centralized funding, and tried to transform their organizational cultures. Furthermore, the findings suggest that organizations feel that the changes in business environment are becoming faster and organizations have the need for dynamic capabilities.

Keywords adapting to changes in business environment, digital strategy, digital transformation, dynamic capabilities, strategic management

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Tiivistelmä

Muutoksia ja disruptioita teknologiassa ja liiketoimintamalleissa tapahtuu enemmän kuin koskaan ennen. Reagoidakseen ja hyötyäkseen näistä muutoksista organisaatiot ovat luoneet digitaalisia strategioita. Pitkän aikavälin digitaalisen strategian toteuttaminen sellaisenaan voi johtaa jäämiseen jälkeen teknologioissa ja kilpailussa, jos organisaatio ei ole kykenevä reagoimaan ympäristön muutoksiin. Tutkielman tarkoituksena on tutkia, miten isot organisaatiot sopeuttavat digitaalisia strategioitaan, jotta voisivat samanaikaisesti toteuttaa pitkän aikavälin digitaalista strategiaansa ja reagoida nopeasti ympäristön muutoksiin. Aiempi tutkimus digitaalisen strategian sopeuttamisesta liiketoimintaympäristön muutoksiin ja kyvykkyyksistä, joita organisaatiot tarvitsevat, on vähäistä.

Tutkielma on toteutettu monitapaustutkimuksena, jossa tutkittiin 11 suurta suomalaista organisaatiota, jotka ovat osoittaneet kiinnostusta digitalisaatiota kohtaan. Yhtä digitaalisen strategian tai liiketoimintastrategian kehittämiseen osallistuvaa henkilöä haastateltiin jokaisesta tapausorganisaatiosta eli yhteensä 11 puolistrukturoitua haastattelua. Data analysoitiin Gioia-metodilla, jotta data-analyysi olisi perusteellista ja aineistossa olevat teemat löydettäisiin yhdenmukaisella tavalla.

Tulokset esittävät, että organisaatiot sopeutuvat ympäristön muutoksiin sopeuttamalla niiden digitaalisia strategioitaan sekä seuraamalla muutoksia ympäristössä, tarttumalla uusiin mahdollisuuksiin ja muuttamalla organisaatioitaan. Tutkielma edistää aikaisempaa kirjallisuutta laajentamalla digitaalisen strategian tutkimusta ja katsomalla dynaamisten kyvykkyyksien teoriaa digitaalisen strategian perspektiivistä. Tulokset ehdottavat, että digitaalinen strategia kehittyy kolmen vaiheen kautta: ensin digitaalisuus mainitaan strategiassa, seuraavaksi organisaatioilla on digitaalinen strategia tai muutosohjelma ja lopuksi digitaalisuus on otettu osaksi liiketoimintastrategiaa. Organisaatiot seuraavat muutoksia osana strategiaprosessiaan, mutta käyttävät myös ulkoisia partnereita, sisäisiä ideoidenkeruuprosesseja ja nimettyjä ryhmiä tukemaan muutosten seurantaa. Uusiin mahdollisuuksiin tarttuminen eroaa tavallisesta tuotekehityksestä ja on tarkoituksena olla nopeampaa ja ketterämpää. Mahdollisuuksia lähdetään kokeilemaan kolmen eri vaiheen kautta, jotka ovat pilotin suunnittelu, sen toteuttaminen ja lopuksi sen lopettaminen tai kasvattaminen tuotteeksi. Toteuttaakseen pilotteja, organisaatiot ottavat asiakkaat mukaan kehitykseen ja yhdistävät kyvykkyyksiä liittyen liiketoimintaan, IT ja ohjelmistokehitykseen ja uuteen osaamiseen. Tukeakseen ympäristön muutoksiin sopeutumista, organisaatiot ovat tehneet muutoksia rakenteeseensa, rakentaneet uusia digitaalisia kyvykkyyksiä, käyttäneet keskitettyä rahoitusta ja pyrkineet muuttamaan kulttuuriaan. Lisäksi, tulokset ehdottavat, että organisaatiot kokevat muutosten liiketoimintaympäristössä nopeutuneen ja organisaatiot tarvitsevat dynaamisia kyvykkyyksiä.

Avainsanat digitaalinen strategia, digitaalinen transformaatio, dynaamiset kyvykkyydet, strateginen johtaminen, ympäristön muutoksiin sopeutuminen

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1 INTRODUCTION

1.1 Background and motivation for the study

During the last few years we have experienced more developments in technology and changes in business models than ever before. According to a survey conducted by MIT Sloan Management Review and Deloitte in 2015, 90% of the executives expect that their industry will be disrupted by digital trends to a great or moderate extent (Kane, Palmer, Nguyen Phillips, Kiron, & Buckley, 2016). Large organizations have also noticed that they must find ways to embrace the changes created by digital disruption (Wessel, 2017). Digital systems and data have brought an enormous number of opportunities, and organizations have a difficult time to explore and exploit them. Easy-to-use digital infrastructure has accelerated the emergence of new technologies (Fichman, Dos Santos, & Zheng, 2014). Smart products are created due to the affordance of pervasive technology since digital technology is increasingly included in physical artifacts which have previously been non-digital (Svahn, Mathiassen, & Lindgren, 2017). Moreover, customers are expecting that digital products or services get cheaper and better all the time and thus incumbents must continuously innovate (Downes & Nunes, 2013). These changes create new expectations and pressure to change for organizations.

Organizations have also noticed and reacted to this development and new possibilities with technology. In 2015, a considerable majority of executives thought that digital technologies are mainly an opportunity (Kane et al., 2016). To embrace the new opportunities digitalization brings and respond to the new expectations, organizations have tried to improve their digital maturity and one action to do it has been creating digital strategies. One concrete sign of creation of digital strategies and their importance for organizations is organizations' urge to hire Chief Digital Officers to lead digital transformations.

In addition to the new technological opportunities, the changes in the business environment have become faster and harder to predict that makes it challenging for the incumbent organizations to stay in the competition. The nature and speed of technology adoption has changed, and it does not happen in predictable stages as before (Downes & Nunes, 2018). Nowadays, the business environment is volatile, complex, and fast and the traditional industry model has shortened from years to weeks (Accenture, 2015).

Innovations are accelerated by digital disruptions and thus the old business models are no more as competitive as before (Accenture, 2015). Whole product lines or even entire markets are destroyed or created overnight which creates need to continuously reassess strategy (Downes & Nunes, 2013). Downes & Nunes (2013) call these disruptions which are different than before and do not follow the disruption theory created by Christensen as "big-bang disruptions" (pp. 46). The previous theory presented that disruptions would come from new-market footholds or low-end markets (Christensen, Raynor, & McDonald, 2015).

These new big-bang disrupters surprise others time after time due to unencumbered development, unrestricted growth, and undisciplined strategy (Downes & Nunes, 2013). According to Downes & Nunes (2013) disruptions can be unplanned and unintentional which makes them hard to predict. Disruptions are challenging for incumbent organizations because the disruption does not always come from the competitors in the same industry or even from organizations with remotely similar business models (Downes & Nunes, 2013). Big-bang innovations are changing the rules of the industry and these rules hold only until the next wave of disruptions (Downes & Nunes, 2013). These new disruptions can be challenging for organizations to detect and respond. However, in order to stay in the competition and survive from disruptions, organizations need to continuously reassess their strategies and adapt to the changes in business environment. The changes are faster than before and harder to predict and thus organizations need to react, explore and assess the significance of also smaller changes in environment.

Decision-making and adaptation of strategy can be challenging in the fast-changing environment because it is increasingly difficult for organizations to understand the new situations and specially to predict the results of actions made to react these changes. This kind of fast-changing world is called with managerial acronym VUCA, which means volatility, uncertainty, complexity, and ambiguity (Bennett & Lemoine, 2014). Based on the knowledge of the situation and the predictability of the results of actions made organizations should act differently (Bennett & Lemoine, 2014). The approaches organizations can use to adapt to the situations which are difficult to plan are investing in information collection, interpretation and sharing, experimenting new opportunities,

restructuring your organization and building in slack and devote resources in preparedness (Bennett & Lemoine, 2014). Thus, organizations need to know well their own situation and be able to adapt its operations.

Digitally maturing organizations have made strategies with time horizons longer than two years (Kane et al., 2016) and organizations need to invest heavily in new technologies and developing its digital capabilities in order to stay in the competition. However, the risk of being disrupted and the fast developments in technology make the future and the result of new investments more uncertain. Organizations cannot be sure what kind of technologies are available or what kind of expectations customers have in a few years due to the fast developments in technology. This makes investments and R&D more difficult than before and there is a risk of locking-in to outdated technology. Furthermore, responding to disruptions can be difficult if organizations strictly follow long-term digital strategy. Thus, organizations should be able to adapt to the fast changes by actively monitoring the changes in business environment, testing new opportunities and by changing their digital strategies when needed.

However, adaptation can be challenging to large organizations due to their culture, structure, legacy systems and the different nature of digital innovations. One example of an organization having difficulties is Kodak in which culture and rigid, bureaucratic structure hindered fast response to new technology which dramatically changed the process of capturing and sharing images (Lucas Jr. & Goh, 2009). Especially the middle management was not able to make a transform to think digitally (Lucas Jr. & Goh, 2009). One indicator for the difficulties to adapt to the changes is that in 2015 only 44% felt their organizations were adequately prepared for the disruptions to come (Kane et al., 2016). Thus, organizations need to find ways to adapt their organization to ensure their survival from the fast changes and potential disruptions.

New technological possibilities have created a need for organizations to enforce their businesses and learn new capabilities by creating digital strategies. Nevertheless, the fast changes in business environment and new type of disruptions have made it more difficult to invest in long-term digital strategy work while reacting to the changes. To better understand how organizations cope with the quick changes and avoid being disrupted, it

is important to study how organizations adapt their digital strategies to the fast-changing business environment.

1.2 Literature and research gap

Even though digital strategy has become a popular topic in organizations and in managerial and consulting literature, the previous research of digital strategy is still scarce. Digital strategy is seen to differentiate from information technology (IT) strategy by being more holistic, trans-functional strategy, which aims to create new differential value to the organization (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Carcary, Doherty, & Conway, 2016; Kane et al., 2016; McDonald, 2012; Sebastian et al., 2017). Digital strategy can be seen to be a strategy on its own (Sebastian et al., 2017), a part of business strategy which will then be a digital business strategy (Bharadwaj et al., 2013; Kane et al., 2016) or a transformative strategy (Matt, Hess, & Benlian, 2015; Yeow, Soh, & Hansen, 2017). In all of these situations the goal of the new strategy is to create new, differential value to the organization (Bharadwaj et al., 2013; Matt et al., 2015; McDonald, 2012; Sebastian et al., 2017; Yeow et al., 2017). In addition, digital strategy should be aligned with business strategy (Matt et al., 2015; Yeow et al., 2017) and be cross-organizational and go beyond functional silos in the organization (Bharadwaj et al., 2013; Kane et al., 2016)

Kane et al. (2016, pp. 5) discuss about "digital maturity" which means organizations' systematic preparation to adapt to ongoing digital challenges consistently. Digital maturity shows how digitally capable and mature organizations can change their business models to be more value-generating and thus achieve significant results in performance (Kane et al., 2016). Effective digital strategies are not about implementing technologies to be more digital but about identifying the opportunity for greatest business impact (Kane et al., 2016).

Digital strategy also includes choices and changes relating, for example, to technology, organizational structure, and culture. Organizations can either develop their own technological standards to become the market leaders in technology or use established standards to solely fulfill business operations (Matt et al., 2015). However, succeeding in

terms of digital strategies requires more than just the best technologies; it is about the process, structure, culture, and skills organizations have (Kane et al., 2016). To make their organizational structures suitable for digital strategy, organizations should remove functional silos and focus on cross-functional collaboration (Kane, Palmer, Phillips, Kiron, & Buckley, 2017). In digitally maturing organizations, organizational cultures share common features, which are appearing larger interest to take risk, fast experiments, significant investments in talent, and recruiting and developing leaders with soft skills (Kane et al., 2016).

One important part of digital strategy adaptation is innovations. Developments in the business environment have made organizations' understanding of the interplay between organizations, markets and product architectures outdated and created new requirements to the way organization innovate (Svahn, Mathiassen, & Lindgren, 2017). The nature of innovation processes and outcomes have changed and there are three traits of innovations; the significant meaning of digital platforms, the emergence of distributed innovations, and the commonness of combinatorial innovations (Yoo, Boland, Lyytinen, & Majchrzak, 2012). These new characteristics of innovations require organizations to learn and change the way of working. For example, to adapt digitally capable organizations have more of both small, iterative experiments and organization-wide initiatives to create innovations (Kane et al., 2017).

The research of how digital strategy could be adapted to the fast changes in business environment and what kind of capabilities organizations need to do that is still scarce. Strategies to avoid disruptions can be following closely the visionaries in the industry, slowing down disruptors and their money-making, changing business model, and diversification (Downes & Nunes, 2013). Kane et al. (2016) see that organizations should also have digital congruence, which is the alignment of culture, people, structure, and tasks, to respond to the challenges in constantly changing digital environment with the help of continuous feedback.

Previous research has presented dynamic capabilities as a way to adapt to fast-changing environment (Teece, Pisano, & Shuen, 1997). Teece et al. (1997) present that dynamic capabilities help integrate, build, and reconfigure internal and external competences to adapt to the changes. Even though the definitions of dynamic capabilities slightly vary,

dynamic capabilities theory has become a popular when studying adaptation to the changing environment. There are especially studies of dynamic capabilities in situations where organizations need to radically change themselves to adapt (Danneels, 2011; Harreid, O'Reilly III, & Tushman, 2007; Lucas Jr. & Goh, 2009; Yeow et al., 2017).

Teece (2007) has built on the theory of dynamic capabilities and presents that the capacities to sense and shape opportunities and threats, to seize opportunities, and to enhancing and reconfiguring organizations intangible and tangible assets can help achieving sustainable advantage and adaptation to environment. Capabilities should be unique and difficult to replicate (Teece, 2007). Dynamic capabilities can be used to constantly create, extend, upgrade, protect, and keep relevant the asset bases organizations have (Teece, 2007).

The previous research does not answer how organizations could adapt their digital strategy to the fast-changing business environment and address new digital opportunities. Even though dynamic capabilities and all the three capacities presented by Teece (2007) have been further researched, digital strategy and how to adapt it have not been researched from the dynamic capabilities view. Overall, the research of adapting and changing digital strategy and what kind of capabilities and competences it requires from the organizations is scarce. There is some research from the dynamic capabilities perspective of digital strategies (Karimi & Walter, 2015; Yeow et al., 2017) but the research does not provide information of what kind of capabilities organizations need and especially do they need some capabilities they do not use with business strategy. As the previous research does not tell about the ways organizations use to adapt their digital strategy, it does not either tell how established and systematic are their operations to increase adaptiveness.

The gap in research is important to fill because the conditions have changed as changes in the environment are happening faster and differently than what organizations are used to. Thus, it is important to understand how adaptation to changes is done. Especially, when there is only a little research about digital strategy, it is important to see how the adaptation is done in the context of digital strategy. Furthermore, the topic has reached a lot of managerial interest because large organizations are unsure how to develop their operation and digital strategy.

1.3 Research objectives and questions

The objective of this research is to study how organizations can simultaneously do their long-term digital strategy work and ensure that they can follow and respond to the changes in business environment to avoid being disrupted. My study aims to fill the gap in research about the digital strategy work and how it can be adapted to the fast-changing business environment. The study aims to find out what kind of methods organizations use for following and responding to the fast changes in business environment and how organizations change themselves to increase their digital capabilities. For the managerial audience this study aims to bring ways to improve their digital strategy work and especially to improve developing new digital solutions.

As the theory of dynamic capabilities discuss about the ways to adapt to the fast-changing environment, my study will use Teece's (2007) theory of sensing, seizing, and reconfiguring as an organizing theory. The use of Teece's (2007) theory as an organizing theory is supported by the background interviews and research of this topic that showed that organizations use similar ways to develop their digital strategy work as the theory presents. However, the research is conducted as an inductive study and is not bound to the themes and terminology in Teece's (2007) theory.

The research question of the study is: *"How do large Finnish organizations adapt their digital strategies to the fast-changing business environment?"*.

The research question is divided in three sub-questions to better understand the ways to adapt. The sub-questions describe the ways to adapt that are seen relevant for this study and help scope the research. The sub-questions are the following:

Sub-question 1: *"What kind of methods and processes do organizations use to follow relevant changes in business environment?"*

Sub-question 2: *"What kind of methods and processes do organizations use to address new possibilities?"*

Sub-question 3: *"How have organizations changed themselves to create needed digital capabilities?"*

As the research questions indicate, my study will concentrate on large Finnish organizations and focus on the ways they can use to adapt while taking into consideration rigidities and burden the large size and long history can bring. The criteria for the sample selection is explained more closely in the Methodology, chapter 3.

1.4 Structure of the thesis

This thesis has eight chapters. In chapter two, the previous research relating to digital strategy and dynamic capabilities research relevant for my research is presented. Chapter three explains the methodological choices made in this thesis and includes descriptions of data collection and analysis methods used. It also shortly explains limitations in this study. Chapter four presents the findings of the empirical study conducted for this thesis and is divided into four parts; digital strategy, following and measuring changes in the business environment, addressing new opportunities, and changing organization to create new capabilities and adaptability. In chapter five, findings from research are discussed with previous literature to point out similarities, differences, and extensions to previous research. Chapter six concludes the findings of this thesis and presents managerial implications and suggestions for future research. Finally, references are presented in chapter seven and appendices in chapter eight.

2 LITERATURE REVIEW

This Master's thesis studies how digital strategy can be adapted to the fast changes in business environment. To better understand this topic, I will present previous research relating to digital strategy and dynamic capabilities in this literature review. The first section of this literature review presents what is a digital strategy and how it differs from IT strategy. It also presents what are the different options organizations have relating to digital strategy and how digital strategy could be adapted concentrating especially on

digital innovations. The second section of this literature review explains what dynamic capabilities are and how they are seen to support adaptation to fast-changing business environment. The second section concentrated particularly on Teece's (2007) theory of sensing, seizing, and reconfiguring and how that theory has been further researched.

2.1 Digital strategy

2.1.1 What is a digital strategy?

Digital strategy has become a popular topic in organizations and in managerial and consulting research. However, the academic research of digital strategy is still scarce. Digital strategy is often seen to differentiate from information technology strategy and to be more holistic way of thinking IT and digital capabilities in organizations (Bharadwaj et al., 2013; Carcary et al., 2016; McDonald, 2012; Sebastian et al., 2017). IT strategy's role is to be more enabling whereas digital strategy is rather business strategy that incorporate the opportunities of digital economy (Sebastian et al., 2017). Sebastian et al. (2017) define digital strategy as: "a business strategy inspired by the capabilities of powerful, readily accessible technologies (like SMACIT), intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions" (pp. 198).

The definition from Sebastian et al. (2017) highlights digital strategy's role as a guidance in the aim to create new value propositions by merging organization's existing capabilities with capabilities enabled by digital technologies such as SMACIT. SMACIT means social, mobile, analytics, cloud and Internet of things (IoT) technologies. Also, McDonald (2012) sees that these customer-facing solutions can create interaction between organizations and customers which differentiates digital strategy from IT strategy. However, the definition of digital strategy from Sebastian et al. (2017) is partly limited because it defines the technologies which could be used. Adaptability to new opportunities and market trends is important for a digital strategy in the long-term and thus concentrating on specific technologies can weaken the possibility to succeed.

Digital strategy can also be seen as a combination of IT and business strategy. IT strategy should be merged with business strategy and to be a "digital business strategy" (Bharadwaj et al., 2013). Also, Kane et al. (2016) support integrating digital strategy to business strategy. Bharadwaj et al. (2013) define digital business strategy as follows: "organizational strategy formulated and executed by leveraging digital resources to create differential value" (pp. 472).

According to Bharadwaj et al. (2013) digital resources are used in all functional areas and digital business strategy goes beyond systems and technologies to digital resources. In addition, they explicitly link digital business strategy to creation of differential business value and raise performance implications to those that drive competitive advantage and strategic differentiation. They believe that resources around digital business strategy should be seen relatively broadly and see that digital business strategy includes: "the design of products and services and their interoperability with other complementary platforms, and their deployment as products and services by taking advantage of digital resources" (pp. 474).

The role of digital strategy is broader in the definition from Bharadwaj et al. (2013) than from Sebastian et al. (2017). According to Bharadwaj et al. (2013) digital business strategy differentiates from IT strategy because it transcends traditional functional areas and thus is trans-functional. The scope of digital business strategy is broader, more embedded, more prominent and more encompassing than other functional strategies. Digital business strategy should be treated as business strategy itself for the digital era and not positioned below business strategy. Also, Kane et al. (2016) see that digital initiatives should go beyond functional silos and digitally capable organization are collaborative.

Part of the previous research has more modest view of digital strategy's role in the organization than Bharadwaj et al. (2013). It is seen that digital strategy should be aligned with corporate strategy (Matt et al., 2015; Yeow et al., 2017). However, for both Matt et al. (2015) and Yeow et al. (2017) digital strategies are used to create transformation in the organization. Whereas, Bharadwaj et al. (2013, pp. 473) see that digital business strategy would be organization's business strategy "for the digital era" which can be thought to be later after the transformation is done.

Kane et al. (2016, pp. 5) discuss about "digital maturity" which means organizations systematic preparation to adapt to ongoing digital challenges consistently. Digital maturity is measured as the utilization of digital technologies and capabilities to improve processes, involve talent across the organization and drive new value-generating business models (Kane et al., 2016). This way of thinking takes into consideration also the digital solutions and tools used for supporting processes and presents well how digital strategy should cover all actions in the organization and not just the main products (Kane et al., 2016). According to Kane et al. (2016) digital maturity also shows how digitally capable and 'mature' organizations can change their business models to be more value-generating and thus achieve significant results in performance. Effective digital strategies are not about implementing technologies to be more digital but about identifying the opportunity for greatest business impact (Kane et al., 2016). Also, McDonald (2012) sees that the real benefits of digital strategy does not come from substituting and automating old process in to a digital from. The real digital edge comes from combining digital information and physical resources in novel ways to create value.

Even though digitalization is seen to bring new opportunities and digital strategy new value, they also have cons. Grover & Kohli (2013) think that all digitalization is not desirable in the long-term and by indiscriminating digital initiatives and by making micro-applications too visible organizations can erode their competitiveness. In digital business strategy, software, process, and information visibility should be balanced with the capability to appropriate value from such systems. System visibility means the aspects of software, process, and information that a competitor can observe, replicate or improve upon. High visibility can expose to imitation but protecting visibility comes at a cost. In addition to the costs of protecting information and customizing the design, opportunities emerging from openness in sharing information, processes, and software is lost. Customers can also see interacting with the organization as inconvenient when the visibility is low. (Grover & Kohli, 2013)

Part of the digital strategy research is concentrated on digital transformation strategies. Organizations which have been previously been successful with more traditional products or services, need to be able to transform with the help of digital transformation strategy in order to have required digital capabilities. As Matt et al. (2015) see, digital

transformation strategy includes transformation of processes, products and structural aspects that are driven by the integration of technologies and addresses organization's attitude towards new technologies and its ability to exploit them.

2.1.2 Creation of digitally capable organization

Even though big, old organizations have been previously concentrated on physical products, they can also transform their organization to be digitally capable. However, organizations' resources are limited and that is why they have to decide where to concentrate their efforts in order to maximize the benefits. Sebastian et al. (2017) have identified two types of digital strategies that guide digital transformation for big, old organizations; customer engagement and digitized solutions. Customer engagement aims to build customer loyalty and trust by offering innovative, superior, customized and integrated experiences (Sebastian et al., 2017). Digitized solutions strategy concentrates on integrating a combination of products, services, and data to reformulate organization's value proposition (Sebastian et al., 2017).

The two different digital strategies have natural synergies, but it is recommended to commit to only one digital strategy because that will help resource allocation (Sebastian et al., 2017). Furthermore, concentrating on too many things and not having clear investment criteria can lead to reacting to immediate one-off opportunities instead of proactively designing their business for digital success (Kane et al., 2017; Sebastian et al., 2017). To ensure successful implementation of digital strategy, organizations need technology-enabled assets described as "operational backbone", which supports efficiency and operational excellence, and "digital service platform", which supports business agility and digital services (Figure 1) (Sebastian et al., 2017, pp. 201).

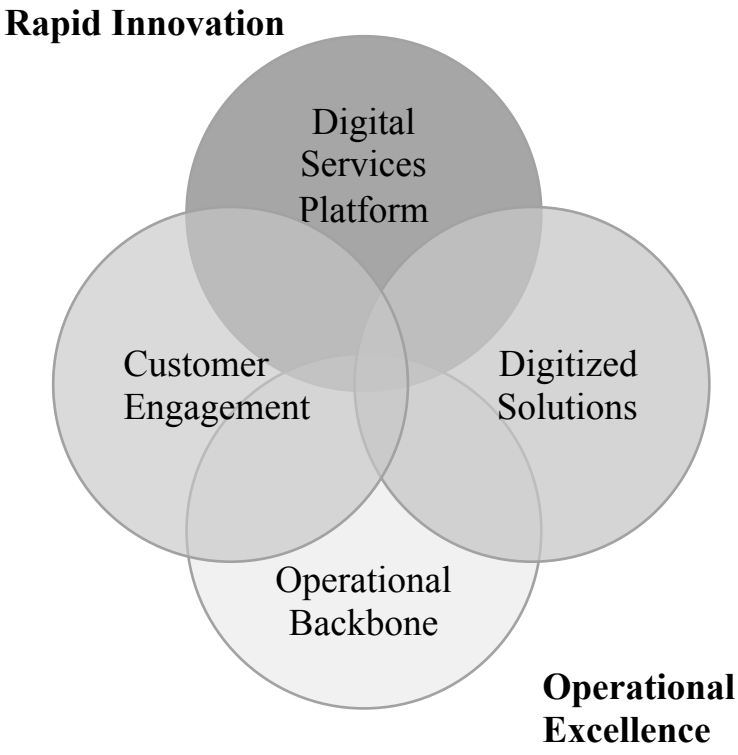

Figure 1: Elements of digital transformation as a big old company (Sebastian et al. 2017, pp. 207)

Operational backbone can help organizations achieve business and technology capabilities needed to efficiency, scalability, quality, and predictability of their core operations (Sebastian et al., 2017). What makes operational backbone powerful is the business capabilities that the used technology enables (Sebastian et al., 2017). However, digital strategy could bring more value than efficiency and scalability achieved by just converting analogical operations to digital. One example of operational excellence is improving cost efficiency that almost half of organizations are trying to achieve (Bughin & Van Zeebroeck, 2017). Cost efficiency is mainly a defensive survival strategy than a source of comparative advantage (Bughin & Van Zeebroeck, 2017). Bughin & Van Zeebroeck (2017) see that also digital distribution channels, and re-bundling and customizing are other defensive strategies which are mainly improving organization's existing operations. Thus, concentrating solely on improving operational excellence is not enough to gain competitive advantage and value for customers and might be just a way to prolong survival in the fast digitalizing business environment. All organizations definitely need operational excellence in order to be competitive and scale up new product innovations successfully but in a situation in which organization's resources are limited,

too significant investments on operational backbone can hurt the development of new opportunities and solutions.

In addition to operational backbone, organizations should have a digital services platform which can help achieve rapid innovations (Sebastian et al., 2017). Rapid innovation can bring agility and help reach responsiveness to new market opportunities (Sebastian et al., 2017). With the help of innovations, organizations can have more offensive digital strategies. Offensive digital strategies can include engaging to a platform strategy, get previously inaccessible sources of supply with the help of digital technologies, and have digitally-enabled products and services (Bughin & Van Zeebroeck, 2017).

2.1.3 Choice of technology and structure to enable digital transformation

Organizations need to choose between two technological strategies when creating digital strategy and transformation. To succeed in digital transformation, Matt et al. (2015) present a Digital Transformation Framework which includes the dimensions of use of technologies, changes in value creation, structural changes, and financial aspects. When considering technology, an organization should decide whether it wants to develop its own technological standards to become the market leader in technology or whether it prefers to use established standards to solely fulfill business operations (Matt et al., 2015). Based on that, it can be thought that using established standards, which is used when the goal of IT is to fulfil business needs and operation, can guide to the direction of operational excellence in the Figure 1 and enhancing operations. At the same time, developing its own technology can bring organizations to the direct of rapid innovations. Thus, one of the drivers when choosing whether to develop organization's own technology or not should be the digital strategy; is digital strategy concentrating on operational efficiency or new innovations.

The choices of technology determine what kind of changes in value creation and structure are needed that are significant parts of digital transformation. The structural changes, for example, in organizational setup are needed to ensure adequate bases for new operations. Matt et al. (2015) propose that the new operations caused by small changes could be

integrated to the existing organizational structure but for substantial changes a separate subsidiary might be needed. However, the use of technology, value creation, and structure can be transformed only when financial aspects enable it. All four dimensions should be tightly aligned to create transformation. (Matt et al., 2015)

Empirical research has also been conducted to support the Digital Transformation Framework (Hess, Benlian, Matt, & Wiesböck, 2016). According to their research, the organizations, which use technology as an enabler, regards IT as their core function and actively follow and develop new digital solutions for their customers. One way to adopt early-stage technologies was by merger and acquisition activities. Nevertheless, in some of the organizations IT is still seen as a support function to reach strategic goals and risks following the implementation of new technologies are minimized.

Organizations need to make sure that their organizational structures are suitable for digital strategy and its holistic nature. Removing functional silos and focusing on cross-functional collaboration, for example with cross-functional teams, is seen important for coping in digital environments (Kane et al., 2017). However, technology can ease collaboration and help defeat the typical barriers of functional silos (Kane et al., 2017).

When changing organizational structure and creating new digital operations, organization can either integrate or separate those digital operation units from the organization (Hess et al., 2016). Hess et al. (2016) say that integration requires less extensive restructuring efforts and bring synergies from the close coordination between new and traditional business. However, separate units could be created from scratch and can physically and ideologically help separate new and old operations (Hess et al., 2016).

Organizations also need to improve their internal resources by developing their current workforce and if needed, they can source additional external resources (Hess et al., 2016). These internal resources include both leadership and other employees. Investing to own talent and hiring new resources are needed to support digital capabilities (Kane et al., 2016). In addition, leadership with the vision required to lead a digital strategy, and a willingness to use resources to achieve this vision are needed (Kane et al., 2017). With internal capabilities and resources organizations are less dependent on partners and can achieve competitive advantage others cannot easily buy from external partner.

Also, the competitive situation and industry turbulence affect how digital strategies and investments are realized. Organizations can concentrate solely on fulfilling competitive norms in their IT investments or they can see digital strategy as a way to differentiate from industry norms by spending significantly more or less compared to industry averages (Mithas, Tafti, & Mitchell, 2013). According to their research of strategic posture, which means organization's level of activity in a given strategic dimension relative to industry average, Mithas et al. (2013) present that industry turbulence increases organizations' actions to have differentiated IT investments. However, the industry turbulence does not affect how organizations make their IT sourcing (Mithas et al., 2013). Overall, many digital initiatives fail because the executives do not expect the reaction of competitors given the industry conditions (Mithas et al., 2013). According to Kane et al. (2017) the organizations which are more mature with digitalization are increasing their digital investments compared to less digitally mature organizations, which threatens to increase the gap in the level of digital success. That is why organizations can support the digitalization in turbulent environments with investments. However, all organizations do not have the equal amount of resources to use and part of the organizations can fall behind in competition due to the lack of resources especially as all of the digital solution do not have established standards and development of new standards can require several digital initiatives.

2.1.4 Organizational and cultural changes to enable digital transformation

The changes organizations need to make in order to implement digital strategy is not limited to structure but also include culture and resources. Kane et al. (2016) studied how digitally mature organizations succeed in developing digital environment. Digitally maturing organizations have cultures that share common features, which are appearing larger interest to take risk, fast experiments, significant investments in talent, and recruiting and developing leaders with soft skills (Kane et al., 2016). Even though leaders need to create the right culture to support digital strategy, being digitally capable also drives the culture and its most important traits (Kane et al., 2017). Right culture and emphasizing the importance of digital capability can help to cope with competing

investment priorities between digital and current business and tie digital business to the organization's core business strategy (Kane et al., 2017).

Also, the commitment to digital strategy is important for being digitally mature and capable. Digital maturing organizations take a longer-term view of digital strategy compared to organizations still in the early stages of digital transformation (Kane et al., 2016; Kane et al., 2017). These long-term strategies concentrate on both technology and core business capabilities (Kane et al., 2017). However, getting resources to have digital initiatives while managing the existing business can be challenging (Kane et al., 2017).

2.1.5 Adapting digital strategy to fast-changing business environment

New digital opportunities and faster changes create new challenges for organizations. As explained in the introduction part of this thesis, creating digital strategy is not enough in the long-term. To execute digital strategy effectively, organizational change and creating flexibility is needed to adjust to fast-changing digital environments (Kane et al., 2017). Organizations should be able to constantly change their operations in the context of digital strategy to exploit the benefits of digital innovation (Nylén & Holmström, 2015). Digital strategy should also be continuously reassessed because the diffusion of digital technologies can change fast and create uncertainty to digital strategy's underlying assumptions (Matt et al., 2015). To make sure that actions to reassess are done early enough, clear procedures for the reassessment are needed (Matt et al., 2015).

Big-bang innovations are changing the rules of the industry and these rules hold only until the next wave of disruptions come along (Downes & Nunes, 2013). Thus, there is almost no time to adapt and bold strategies are the only way to survive (Downes & Nunes, 2013). Downes & Nunes (2013) present four strategies to survive from disruptors and adapt especially against digital threats. The first strategy is to learn to recognize the warning signs. The warning signs might not include losing of low-end customers as before. Best way to recognize the real signs from all the noise can be believing "truth tellers" (pp. 52). Truth tellers are visionaries who are talented and has deep understanding of the industry and thus they are hard to find. The second strategy that Downes and Nunes (2013)

presents is to slow down the disruptions by acquiring competitor or creating your own product until your organization can survive from the disruption. Money-making of potential disruptions can be slowed down by lowering prices, locking customers with long-term contracts and forming alliances with partners critical to the disrupter. The third strategy is using exits to get rid of old business model and to create new. The fourth strategy is that diversification can help adapting to the cyclical industry. Diversification allows changing to other products when the original product is disrupted. Building future strategies on a platform that can be extended or experimented with or scales up or down can help launching innovations. (Downes & Nunes, 2013)

Kane et al. (2016) see that digital congruence is needed to respond to the challenges in constantly changing digital environment. Digital congruence is the alignment of culture, people, structure, and tasks and it is shown in the Figure 2. In short, culture should embrace risk, skills in the organization should be deepened, structure should be agile and nimble, and workforce should be contingent and work customized. (Kane et al., 2016)

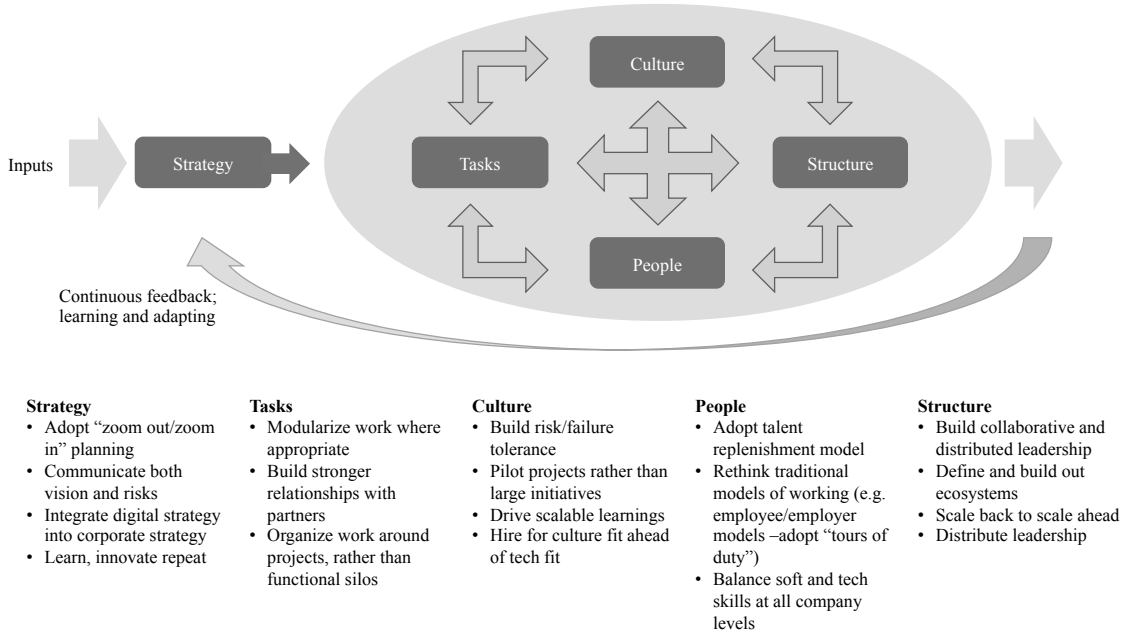

Figure 2: Digital congruence model (Kane et al., 2016, pp. 14)

The results from Kane et al. (2016) show well how succeeding in terms of digital development requires more than just the best technologies. The success is about the process, structure, culture, and skills organizations have. Thus, the ability to react to the

changes can be seen more important than the technologies which come and go, and organizations should invest in developing the organization and its capabilities. Even though digital strategies are unique to organization's industry and opportunities, digital culture drives digital efforts across industries (Kane et al., 2016).

The findings in the congruence model from Kane et al. (2016) in Figure 2 are similar than in other research. For example, both Kane et al. (2016) and Bharadwaj et al. (2013) see scale as important for digital strategy and initiatives. Bharadwaj et al. (2013) state that the scale of digital business strategy should be considered both in physical and digital terms. This can mean, for example, capability to digitally scale up or down its infrastructure, scale rapidly with network effects, scale to match the abundance of data, and scale through alliances and partnerships which is also supported by Kane et al. (2016). Scaling is important in adaptation since it brings flexibility and possibilities to produce new product fast if it becomes successful inside or outside of the organization.

Adaptation of the digital strategy is also studied from the dynamic capabilities perspective. Sensing, seizing, and reconfiguring dynamic capabilities can help adapt digital strategy (Wagner, Wenzel, Wagner, & Koch, 2017; Yeow et al., 2017). Dynamic capabilities can support the alignment of digital strategy to the business strategy (Yeow et al., 2017). Online communities can also help adaptations and be used in all sensing, seizing and reconfiguring dynamic capabilities (Wagner et al., 2017). Even though use of dynamic capabilities to adapt has been widely researched in the context of business strategy, the research of dynamic capabilities and digital strategy is still scarce. In the section 2.2, I will take a closer look to dynamic capabilities and their microfoundations.

Innovations have a significant role in the adaptation to the fast-changing environment. Innovations are especially important in the context of digital strategy since there are still numerous unfound opportunities created by digitalization. With new innovations organizations can create value to the customers, for example, in the form of new products or improved processes. New innovations are also created to the current markets and circumstances and can help compete against disruptions. In the next section 2.1.6 I will take a closer look to digital innovations to better understand how they differ from traditional innovations and how they could help in adaptation of digital strategy.

2.1.6 Innovations in digital strategy

One of the main components in digital strategy is creating differential value and new value-generating business models. To fulfill that goal and to adapt to the changes in environment, organizations need to constantly innovate and develop new solutions. Innovations are also critical in order to stay in the competition. Developments in the environment, such as software options and digital technology have made organizations' understanding of the interplay between organizations, markets and product architectures outdated and created new requirements to the way organization innovate (Svahn et al., 2017). Digital technology is embedded in the core of the products, services, and operation of organizations and radically changes the nature of product and service innovations (Yoo et al., 2012). If organizations concentrate too much on making the first-generation products as compelling as possible that will weaken their capability to react to the shorter product cycles and innovate. Being "lean" in the development is not enough because of the shorter product cycle and that is why organizations should start developing new product before the previous saturates (Downes & Nunes, 2018). Organizations should also be courage enough to try new types of products. Making a platform instead of a product can bring flexibility to add services, redesign interfaces and change back-end relationships with suppliers when markets evolve (Downes & Nunes, 2018). Digitally capable organizations have more of both small, iterative experiments and organization-wide initiatives to create innovations (Kane et al., 2017). Thus, courage to innovate and understanding what is required to innovate successfully is needed for all organizations despite the industry.

Digital innovation means using digital technology during the innovation process to create market offerings, business process, or models, or the outcome of the innovation (Nambisan, Lyytinen, Majchrzak, & Song, 2017). The re-programmability and data homogenization of digital technology has created an environment of open and flexible affordances used in developing innovations with unique characteristics of convergence and generativity (Yoo et al., 2012). According to Yoo et al. (2012) the affordance of pervasive digital technology enables convergent innovations by bringing user experiences together, embedding digital technologies in previously non-digital, physical artifacts. The

generativity of innovations means that digital technologies become inherently adaptable and dynamic (Yoo et al., 2012). New capabilities can be added after a tool or product has been designed, the innovations come in waves, and digital technologies leave a large volume of digital traces, which can lead to new innovations (Yoo et al., 2012). These characteristics have changed the nature of innovation processes and outcomes, and Yoo et al. (2012) have identified three traits of innovations; the significant meaning of digital platforms, the emergence of distributed innovations, and the commonness of combinatorial innovations.

2.1.6.1 *Digital technology platforms*

Platforms have emerged as a central focus on innovation due to its flexible, open affordances (Yoo et al., 2012). Platform-based innovations differ from traditional mix-and-match innovation strategies often used in modular products (Boudreau, 2012). As part of their digital strategies, one third of organizations have engaged in platform strategies trying to redefine their industry's value chain and how value is distributed (Bughin & Van Zeebroeck, 2017). Increasing digital tools and digital components enable building platform of not just products but digital capabilities used throughout the organization. This can bring same efficiencies across the organization and innovation activities become horizontal (Yoo et al., 2012). Enabling this kind of innovations might require changes in the organization but support the idea of digital strategy's holistic and often transformative impact to the whole organization. However, organizations need to balance between generativity and control in the platform (Yoo et al., 2012) which is connected to the key concerns of control versus flexibility and internal versus external resources in digital innovation (Svahn et al., 2017). If organization controls the platform too much, it can have the risk of driving out third-party developers and decreasing the generativity of its platform (Yoo et al., 2012). On the other hand, if there is no control, the platform becomes too varied and fragmented (Yoo et al., 2012).

2.1.6.2 *Distributed innovations and use of resources*

The characteristics of digital innovations affect the way resources are used and where in the organization innovations are done. Due to the use of IT, the cost of coordinating innovation activities has distributed nature of innovation product and process, and moved innovations more often toward the periphery of organizations (Yoo et al., 2012). This has increased the heterogeneity of needed knowledge resources which can be seen as the challenge to balance internal and external resources mentioned by Svahn et al. (2017). Innovation of convergent products may need information from completely different industries (Yoo et al., 2012) which may create the need to use external resources. As Svahn et al. (2017) found too strong focus on doing internally can lead to overlooking important opportunities for boundary-spanning value creation whereas too strong focus on external resources can the equilibrium of internal work arrangements. Thus, the internal skills and relationships should be developed at the same time as external resources and partners are used (Svahn et al., 2017). However, this might be challenging when the innovations are widely distributed in the organization.

2.1.6.3 *Combinatorial innovations*

One sign of generativity are the combinatorial innovations. Evolutionary process of new technologies is becoming faster, and the development evolves in a combinatorial manner in several rounds (Nylén & Holmström, 2015; Yoo et al., 2012). Due to combinatorial innovations, organizations need to invest in new forms of creativity and have more complex innovation processes. Nylén & Holmström (2015, pp. 58) present that one way to support digital product and service innovations is "digital evolution scanning". It means gathering intelligence on new developments in digital devices and solutions to exploit new opportunities for innovation and new user behaviors which are developed combinatorially (Nylén & Holmström, 2015). In digital evolution scanning, organizations should consider how they could actively participate to this technology development on top of the existing components (Nylén & Holmström, 2015).

Another way to achieve combinatorial innovation and harness complexity is improvisation (Nylén & Holmström, 2015). Improvisation is an act of reconfiguration and involves risk taking (Nylén & Holmström, 2015). However, improvisation include the key concerns of flexibility versus control and product versus process in digital innovation discussed by Svahn et al. (2017). Too much control can decrease improvisation whereas too much flexibility can decrease the use of best practices and too wide resource distribution. As Svahn et al. (2017) explain, organizations should try to balance between creating new design and management processes and using digital technology in products and services to overcome the competing concern of how to distribute resources and time horizons in innovation.

Unpredictability and accidents can also support combinatorial innovations. Specific conditions can help remain open to accidents and help intentionally design processes and surroundings prone to valuable accidents (Austin, Devin, & Sullivan, 2012). They found that environments which are promoting innovation are open to accidents. The accidents are also affected by organization's cost control and the employee's openness to seek out accidents intentionally (Austin et al., 2012). They see that employee's openness to accidents is influenced by expertise, specific techniques, technologies and the adaptability of materials. In addition, employees who collect knowledge without any specific idea for reusing it, facilitate high number of valuable accidents instead of employees who collect only knowledge they are planning to reuse. To get out of "cone of expectations" (pp.1517) and find new innovations, they recommend designing digital systems to offer an option of random variation, to encourage random information retrieval and frequent revisiting of collected knowledge, and to support changing of iteration rates.

The combinatorial nature of digital innovations emphasizes the need of adaptability in the context of digital strategy. As innovations occur in phases, organizations cannot satisfy to their current products since there can always be new combinatorial innovations or the innovations can lead to a different direction than the organization expects. Thus, continuous scanning of the market and new innovations are required in order to adapt to the changes.

2.1.6.4 *New skills and resources for digital innovations*

The new unique characteristics of digital innovation create a need of new type of skills and balance between existing and requisite capabilities (Svahn et al., 2017). Incumbent organization should acquire new skills for digital innovation without making all existing skills obsolete or hurting existing product innovation processes (Nylén & Holmström, 2015; Svahn et al., 2017). In case organizations are not able to get rid of core rigidities and create new capabilities, competency traps can weaken effective responses to digital options (Svahn et al., 2017). The skills gained from developing analog products should be leveraged by examining how learning is promoted and supported in the organization (Nylén & Holmström, 2015). However, retraining and new kind of incentives are needed to acquire digital skills. Even though external resources can be useful for some projects, developing organization's own skills creates needed agility to handle the fast pace of digital innovation process (Nylén & Holmström, 2015). The creation of new skills can create tension between the employees who try to bring change and those who capabilities have become core rigidities (Svahn et al., 2017). Thus, getting new skills and capabilities can be challenging to incumbent organizations. In case the organization is not able to innovate on its own to stay on the market development, acquiring an organization with next generation disruption can offer an easier solution (Downes & Nunes, 2018). However, it is widely known that acquisitions have several challenges and thus might not solve organizations challenges in the long-run.

2.1.7 Conclusion of digital strategy

As the previous literature presents, digital strategy is not the same as IT strategy (Bharadwaj et al., 2013; Carcary et al., 2016; McDonald, 2012; Sebastian et al., 2017). Digital strategies are relevant and important to organizations due to the new opportunities and potential value digitalization can bring. In addition, digital strategies are needed in order to stay in the competition and to follow the new developments and innovations.

What is common in all of the definitions of digital strategy mentioned in this literature review is the goal to create new value and the view that digitalization affects to the whole

organization and not just one function. In addition, both Sebastian et al. (2017) and Kane et al. (2016) emphasize one of the main considerations in the digital strategy is responding and adapting to the changes in environment. Thus, in this thesis, digital strategy is seen to be a strategy which utilizes digital resources to create new value across the organization. Digital strategy includes transforming the old process from analogical to digital and developing totally new value-generating process across the organization. Moreover, one of the key tasks of digital strategy is to ensure the capability to adapt to the digital challenges and changes.

However, solely converting processes from analogical to digital and improving operational efficiency does not provide all the benefits and opportunities digitalization can bring. To ensure managing the fast-changing digital environment where the disruptions are different than before, organizations should aim to concentrating on digital innovations to create new differential value to customers. Even though operational efficiency is valuable for all organizations, digital technology enables scalability and efficiency in ways that could not be achieved with traditional products. If organizations do not innovate and try to offer something new to the customers, they can be easily disrupted. Thus, I see that achieving operational efficiency is the starting point for digital transformation but in the long-term organizations should add digital innovation components to the strategy in order to stay in the competition and adapt. Hence, in case organizations would have limited resources for the new digital initiatives, they would move from one strategic concentration to another, but they should not concentrate solely on improving operational efficiency in the long-term.

Based on the previous research, in Figure 3, I will present two different digital strategy concentrations organizations can have. The first option is digital efficiency strategy which concentrates on converting processes from analogical to digital and improving efficiency in the organization. This kind of digital strategy is a good starting point for digitalization and helps transform the organization to the digital time. However, organizations should aim to digital innovations strategy in order to fully utilize the benefits of digitalization and adapt to the fast changes. Digital innovation strategy can bring new value which cannot be achieved with operational efficiency strategy but requires more resources, commitment and risk-taking. Due to these higher requirements, all organizations are not

able to add the digital innovation components to their digital strategy. Figure 3 is a synthetization of previous research of digital strategy which have been presented earlier in this literature review. The main sources of information are Sebastian et al. (2017), Kane et al. (2016), Kane et al. (2017), Bughin & Van Zeebroeck (2017) and Matt et al. (2015).

	Operational efficiency strategy →	Digital innovations strategy
Description	• Converting processes from analogical to digital to gain efficiency	• Innovating new opportunities to create differential value
Characteristics	• Defensive survival strategy • Following and reacting to changes	• Offensive strategy with long-term view • Creating internal capabilities and scalability to stay ahead
Changes to the organization	• Digitalizing internal processes	• Changing organizational culture to support digitalization • Encouraging cross-functional collaboration
Technology strategy	• Using established technology standards	• Developing and testing new technologies
Requirements	• Investments to improve internal processes	• Alignment of culture, people, structure, and tasks • Higher amount of resources and investments • Risk-taking to find undiscovered opportunities
Examples of changes in offering	• Digitally supported internal processes • Digital distribution channels • Re-bundling and customizing	• New innovations • Using platforms • Digitally-enabled products and services • Utilizing previously inaccessible sources of supply
Results	• Improves current business and can lower costs but does not create differential value or adaptability to disruptions	• Requires more resources and commitment from the organization but makes new innovations, differential value and adaptability possible

Figure 3: Two different digital strategies

However, what is challenging in the digital innovation strategy is to know how technology and customer expectations are going to develop and in which the organization should concentrate next. Due to the fast changes in environment and the new nature of disruptions, organizations need to continuously reassess their digital strategies and develop their offering. Nevertheless, having the digital strategy is not enough and the right capabilities are needed to adapt to the changes. In order to do that, organizations need new capabilities, alignment of culture, people, structure, and tasks, and new innovations. In the chapter 2.2 I will present dynamic capabilities which can help organizations adapt to the changing environment and to gain advantage and new innovations.

In addition to the digital strategy, organizations should change the way they do product development and innovations to better suit digital innovations to support adaptation to the changes in business environment. Organizations need new skills to support digital innovations, but they should avoid tension in the organization because of making the existing skills and product innovation processes obsolete (Nylén & Holmström, 2015; Svahn et al., 2017). Organizations should also embrace and exploit the combinatorial

nature of innovations that provide the opportunity to adapt the product and develop it further during the product innovation process. Improvisation in product development suggested by Nylén & Holmström (2015) can also support adaptation to new expectations. Digital innovations have changed the innovation work by distributing innovations across the organization (Yoo et al., 2012) that provide new opportunities to use the knowledge in business units. Furthermore, organizations should exploit digital platforms in creating new solutions because it can bring efficiencies across the organization (Yoo et al., 2012).

2.2 Dynamic capabilities

One of the main theories of strategy adaptation to fast-changing environment is dynamic capabilities. The research of dynamic capabilities became popular by Teece et al. in 1997 and since then the research has developed and different perspectives have been created. In this literature review, I will shortly discuss about the most noted views of what are dynamic capabilities, how dynamic capabilities differ from ordinary capabilities, and present literature relating to Teece's (2007) model of sensing, seizing and reconfiguring.

2.2.1 What are dynamic capabilities?

The theory of dynamic capabilities became known by the article from Teece et al. in 1997. Their theory of dynamic capabilities explains the sources and ways of wealth creation and capture in fast-changing technological environment. They suggest that the dynamic capabilities approach help gaining competitive advantage in challenging environments. They see that competitive advantage is created by the ways things are done in the organization; its routines or patterns of practice and learning. Teece et al. (1997) define dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (pp. 516). With this definition they emphasize that dynamic capabilities are built inside the organization to be able to adapt to the fast-changing environment.

Eisenhardt & Martin (2000) has a slightly different view of dynamic capabilities. They define that dynamic capabilities are the processes that use resources to respond and develop market change. These processes include integration, reconfiguring, and gaining and releasing resources. They see that dynamic capabilities are organizational and strategic routines to gain new resource configurations when markets change. They claim that dynamic capabilities are more homogenous than Teece et al. (1997) present and that dynamic capabilities have significant similar characteristics between organizations which are often called "best practices". Due to the possibility to copy dynamic capabilities across organizations, their value is based on resource configurations that they create and not in the capabilities themselves (Eisenhardt & Martin, 2000).

Zollo & Winter (2002) sees that the definition of dynamic capabilities from Teece et al. (1997) is lacking the information of where these capabilities come from. They present that dynamic capabilities are learned and stable patterns of shared activity and are used to evolve operating routines to improve effectiveness. They want to highlight that dynamic capabilities are structured and persistent, and disjointed way of adaptation is not dynamic capabilities.

Previous research have differing views of the importance of fast-changing environment for dynamic capabilities. Teece et al (1997) present that the dynamic capabilities are a way to respond to the demands of rapidly changing environment and in their theory dynamic capabilities are strongly linked to the fast-changing environment. Eisenhardt & Martin (2000) have a slightly different view and they see that the dynamic capabilities differ in high-velocity markets and in moderately dynamic markets. According to their view, in moderately dynamic markets the dynamic capabilities are relying on existing knowledge whereas in high-velocity markets new knowledge which is situation-specific is more important. The effective dynamic capabilities in faster changing environment are simpler and simple routines keep managers concentrated on relevant issues without locking to the past experiences (Eisenhardt & Martin, 2000). On the other hand, research see that dynamic capabilities do not require volatile environments and the organizational capabilities should not be confused with external conditions (Zahra, Sapienza, & Davidsson, 2006). However, the dynamic capabilities are more valuable in fast-changing environment (Zahra et al., 2006; Zollo & Winter, 2002).

Other requirements are also presented to the environmental context of dynamic capabilities. According to Teece (2007) having dynamic capabilities is particularly relevant to multinational organizations in environment which has certain characteristics and thus depend upon the capability to identify and develop new opportunities. Firstly, the environment should be open to global commerce and totally open to the opportunities and threats created by changes in technology. Secondly, the changes in technology must be combined to develop products and services that customers need. Thirdly, well-developed global markets for trade should exist. Lastly, the market to exchange technological and managerial know-how should be poorly developed.

Previous research includes varying views about the outcomes and benefits of dynamic capabilities. Teece et al. (1997) present that dynamic capabilities affect to organization's wealth creation and can improve organization's performance. It is also seen that the relationship between performance and dynamic capabilities is indirect and dynamic capabilities do not ensure organizational success or survival (Zahra et al., 2006). Winter (2003) claim that having dynamic capabilities includes costs due to long-term commitments to specialized resources. They see that it is possible to change without dynamic capabilities and this change behavior could be called ad hoc problem solving. Ad hoc problem solving is a less costly substitute to dynamic capabilities and thus can be better option for some situations (Winter, 2003). The dynamic capabilities theory and its link to performance have reached criticism of being tautological (Barreto, 2010; Williamson, 1999). Stating that the purpose of dynamic capabilities is to address fast-changing environment and saying that organizations with dynamic capabilities perform better in fast-changing environment confuses the concept and the main proposition (Barreto, 2010).

2.2.2 Difference between dynamic and ordinary capabilities

When discussing about dynamic capabilities, it is important to notice that all capabilities organizations have are not dynamic capabilities. Capability is organization's capacity to deploy resources (Amit & Schoemaker, 1993). The role of capability is to fill the gap between intention and outcome so that the outcome resembles what was intended (Dosi,

Dosi, Nelson, & Winter, 2000). According to Winter (2003), organizational capability means high-level routines which provides organization's management a set of decision options to produce significant outputs and ordinary capabilities are those that allow an organization to "make a living" in the short term (pp. 991). Organization's ordinary capabilities provide the foundation for organization's operations (Drnevich & Kriauciunas, 2011). Dynamic capabilities operate to modify, extend or create ordinary capabilities (Winter, 2003).

The line between ordinary and dynamic capabilities can be blurry (Helfat & Winter, 2011). Dynamic capabilities are defined to be used in changing environments, but change is always occurring at some level. It can be difficult to set a precise threshold level of change that differentiates the ordinary capabilities from dynamic capabilities (Helfat & Winter, 2011). In addition, Helfat & Winter (2011) present that some capabilities can be used both for operational and dynamic purposes because they serve both purposes or they have different variants. Thus, it can be difficult to define which capabilities are ordinary and which dynamic.

Also, Teece (2014) claims that capabilities can be divided to ordinary and dynamic capabilities. Ordinary capabilities increase efficiency and include carrying out administrative, governance-related, and operational functions that are technically necessary to accomplish tasks (Teece, 2014). Whereas, he thinks that dynamic capabilities are higher-level activities that can help direct ordinary activities toward high-payoff endeavors. Dynamic capabilities govern other organizational activities and can help generate superior profits by developing products that address existing and new markets. Organization's history affects greatly to the dynamic capabilities and decrease the possibility to copy them to other organization. Long-term enterprise growth and survival can be found with the combination of good strategy, ownership of VRIN resources (valuable, rare, imperfectly imitable, and non-substitutable), scale, strong dynamic capabilities, and access to strong ordinary capabilities. Teece (2014) sees that organizations that last need to be d-effective, which means having strong dynamic capabilities.

2.2.3 Sensing, seizing and reconfiguring to adapt to fast-changing environment

Teece (2007) built on to the previous research of dynamic capabilities to explain the organization-level competitive advantage over time. He divided the dynamic capabilities into three capacities. The first capacity is "to sense and shape opportunities and threats", second is "to seize opportunities" and the last capacity is "to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets" (Teece, 2007, pp. 1319). According to his research, sustainable advantage requires dynamic capabilities which are unique and difficult-to-replicate. Dynamic capabilities can be used to constantly create, extend, upgrade, protect, and keep relevant the asset bases organizations have. In addition to the capability to adapt to the changes in environment, dynamic capabilities also entail the capacity to shape the ecosystem organization participates, to develop new products and processes, and develop and implement new business models. He sees that the development of dynamic capabilities is the key to organization's success and sensing, seizing, and reconfiguring mechanisms are needed to direct financial resources consistent with marketplace needs and imperatives. The model from Teece (2007) of foundations of dynamic capabilities and business performance is presented in Figure 4.

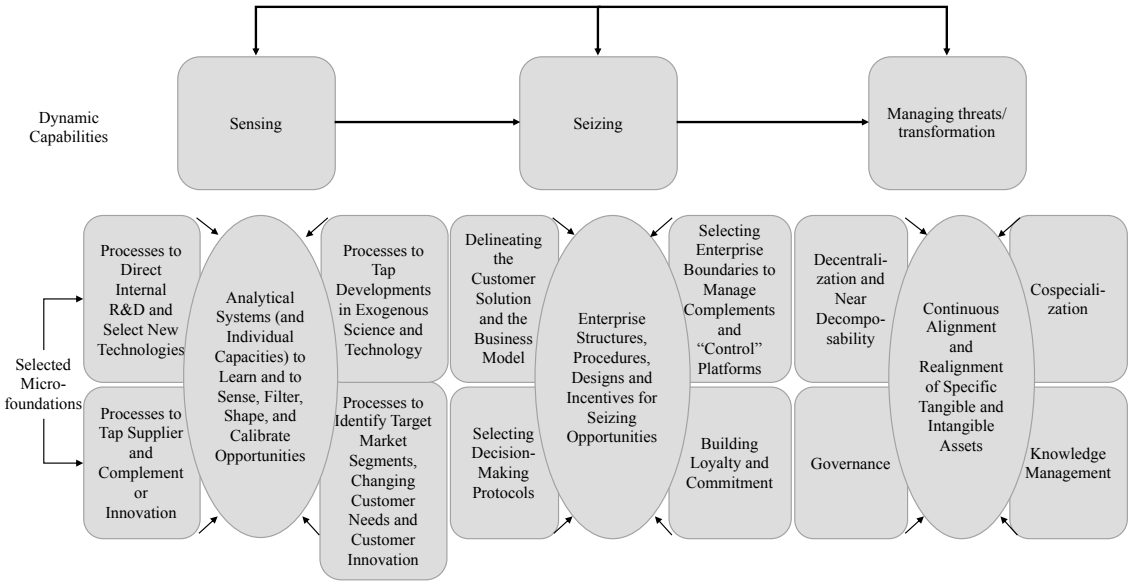

Figure 4: Foundations of dynamic capabilities and business performance (Teece, 2007, pp.1342)

Based on his framework, Teece (2007) says that the nature and amount of intangible assets organization will create and the profits it can earn is determined by the extent to which organization develops and uses superior dynamic capabilities. Even though organizations are not trapped by their pasts, their past will influence future performance. In addition, all the dynamic capabilities require allocation, reallocation, combination, and recombination of assets and resources.

Next in this literature review, I will present further research of each of the theory's components to achieve better picture of the previous research and empirical findings relating Teece's (2007) model and its microfoundations. The review will be mainly concentrated on literature made based on Teece's (2007) model even though similar elements can be found also in other previous research. Teece's (2007) model has been widely noted and provides good, concentrated frame for my research.

2.2.3.1 *Sensing*

Sensing is the first phase of dynamic capabilities in Teece's (2007) model. To be able to react to the fast changes in environment, organizations need to know what is happening around them. Changes can be e.g. in competition, customer needs, or technology. To be able to adapt these changes, organizations need to first sense and later shape them (Teece, 2007). Changes do not form opportunities in and of themselves and thus the efforts to understand the signals of changes are the process of recognizing opportunities (Gregoire, Barr, & Shepherd, 2010). Sensing new opportunities often includes scanning, learning, creation, and interpretive actions (Teece, 2007). Organizations can have processes inside the organization to gather new technological information, follow customer needs and competitor activity, utilize developments in exogenous science, and new opportunities of products and processes are needed to sense opportunities (Teece, 2007). Important part of sensing is also to search changes and potential collaborators in innovation activity in organization's business ecosystem (Teece, 2007).

Sensing might sound obvious and easy but solely noticing an opportunity or change is not enough. Day & Schoemaker (2016) see that in sensing organizations should have peripheral vision which includes scoping the sensing. Scoping means how widely to scan

and what issues to address first, and it should be guided by learning from past, examining the present, and envisioning new futures (Day & Schoemaker, 2016). Also, Teece (2007) sees that in addition to researching the environment, organizations need to understand the latest changes and figure out how to explicate developments in the market, which market segments to target, and which technologies to pursue. They need to evaluate how technologies will evolve and what kind of reactions competitors, suppliers, and customers will have to the developments (Teece, 2007). This evaluation should be done fast in a progressive, forward-looking way (Hodgkinson & Healey, 2011). To do that, organizations should remove dysfunctional fixations with existing strategies to minimize decisional bias, inertia, and strategic persistence (Hodgkinson & Healey, 2011).

Sensing capabilities should be embedded inside the organization and its processes (Dong, Garbuio, & Lovallo, 2016; Teece, 2007). One of these processes inside the organization is hypothesis development and testing (Day & Schoemaker, 2016; Teece, 2007). The sensing capability which proactively create hypotheses about observed events and test these created hypotheses can be called generative sensing (Dong et al., 2016). With these hypothesis, organizations try to explain surprising or anomalous events (Dong et al., 2016). According to Dong et al. (2016) managers should concentrate more on problem definition than problem solving to be successful in sensing. This would help incumbents to disrupt their own business before others disrupt it. In addition, as the emphasis of generative sensing is on hypothesis generation, managers should be rewarded for identifying situations which require explanation and developing testable hypothesis. Dong et al. (2016) see that hypothesis testing should be supported through appropriate resources allocation and organizations which are flexible in resources allocation are likely to develop new products and services. Also, Teece (2007) emphasize the meaning of investment in research and related activities to enable sensing. However, dynamic capabilities cannot be built solely on making R&D investments; coordination of resources is more important (Dosi et al., 2000).

As we can notice, there are several different areas to sense which makes the process challenging. The information and understanding of all the topics sensed might be scattered to several employees or around the organizations which makes the evaluation of them difficult. In addition, organization needs good processes and ways to measure

them correctly and effectively evaluate the information from sensing. It can be, for example, difficult to know when a new technology or a new competitor is really successful and disrupt the market and when it does not. Teece (2007) presents that organizations' articulated strategy selects to which opportunities the organization concentrates and one way to facilitate sensing is to utilize some analytical framework. However, the previous research of evaluating and measuring opportunities is still scarce and the research does not present tools or processes to support evaluating of sensed information.

Cognitive capabilities also have a significant meaning in sensing. Cognitive capabilities are needed to blend effective analysis with the use of intuitive processes (Hodgkinson & Healey, 2011). Organizations which use tools and processes trying to change mental models underpinned by emotionally supportive mechanisms are less likely to have cognitive blind spots and strategic inertia than organizations with processes without emotionally supportive mechanisms (Hodgkinson & Healey, 2011). Moreover, Hodgkinson & Healy (2011) propose that including intuition in sensing capabilities is more effective way to identify and respond to opportunities and threats than trusting solely on analytical approaches.

Using intuition can enable better or even faster understanding of opportunities and threats but often requires previous knowledge or individual capabilities. Organizations use their prior knowledge to see patterns and to "connect the dots" (Baron & Ensley, 2006; Gregoire et al., 2010; Hodgkinson & Healey, 2011). Using prior knowledge in sensing is important because it allows to focus on key structural parallels and to look opportunities from markets which share few superficial features with the context where the technology was developed (Gregoire et al., 2010). Mental connections and patterns can include considering the similarities between the sensed information and the context where this information can be meaningful (Gregoire et al., 2010). In addition, organizations need to consider the alignment between how a technology operates and its cause-effects with others' reactions (Gregoire et al., 2010). Pattern recognition can help recognize threats earlier and enable more effective responses (Helfat & Peteraf, 2015).

In addition to perception, attention is a significant cognitive capability for sensing. Focusing on relevant stimuli can facilitate environmental scanning and alertness can ease

detection and creation of new opportunities. Orienting capacity help turn attention to relevant information. (Helfat & Peteraf, 2015)

Cognitive capabilities relying on individual managers have weaknesses compared to more analytical processes. Emphasizing cognitive processes and intuition in sensing capabilities creates a risk for human errors and biases. On individual manager level, the prior experiences shape the perceptions managers have and those shaped perceptions will become part of the experience base (Helfat & Peteraf, 2015). Thus, it is important that managers' understanding of the current situation is correct and relevant because otherwise it will falsify their experience base and lead to wrong interpretations in the future. Interpreting data correctly is important to ensure accurate opportunity recognition and for creation of opportunities which is dependent on feedback from the environment (Helfat & Peteraf, 2015). However, the networks an individual employee has within and across organizations can help scanning by bringing more diverse information (Helfat & Martin, 2015). Also, using triangular perspective on a complex issue can help probe more deeply and avoid biases (Day & Schoemaker, 2016). In addition, empowering everyone in the organization to speak and share their intelligence can help the organization to collect information from several sources so one manager's views and biases will not affect the organization so strongly (Day & Schoemaker, 2016).

Sensing capabilities are similar across a single industry (Jantunen, Ellonen, & Johansson, 2012). Commonalities of capabilities between organizations are caused by the requirements of the operating environment because similar environmental conditions create same needs to organizations to perform similar types of functions (Jantunen et al., 2012). Even though organizations would use similar type of sensing capabilities, the cognitive sensing capabilities between individual managers differ (Helfat & Peteraf, 2015; Helfat & Martin, 2015). The differences between cognitive capabilities can be because of different prior knowledge or due to the difference in the use of automatic versus controlled mental processes (Helfat & Peteraf, 2015). Different backgrounds of managers can cause differences in absorptive capacities for different types of information which leads to different opportunities sensed (Helfat & Martin, 2015). Due to the differences in cognitive capabilities, organizations which trust mainly on cognitive processes can be vulnerable and dependent on individuals because everyone in the

organization cannot perform on the same level or some individuals might leave the organization. Thus, using analytical processes in sensing can bring more consistent results and help match the overall sensing level in the industry.

Sensing new opportunities and threats will not bring competitive advantage for the organization if the information is not used effectively. Sensing capabilities are not enough to create change and they need to be combined with responding capabilities to support performance (Roberts & Grover, 2012). Sensing influence performance indirectly through seizing and reconfiguring and thus presenting dynamic capabilities as a chain is meaningful (Maijanen & Jantunen, 2016). Organizations should have alignment between strong sensing capabilities and strong responding capabilities to respond to customer-based market opportunities (Roberts & Grover, 2012). Thus, organizations should take into account the transition from sensing to seizing and make it as effectively as possible. The information gathered on sensing is valuable only if it also seized and that is why no meaningful information should be forgotten due to bad transition. Nevertheless, the seizing phase and resources for it should not be strained due to overload of opportunities. Thus, the meaning of sensing in adaptation process and evaluating the sensed information should not be underestimated even though it does not bring immediate results in performance.

2.2.3.2 *Seizing*

After an opportunity is sensed and evaluated to be promising it moves to seizing. In seizing the opportunity is addressed through new products, processes, or services that often requires investments in development and commercialization activity (Teece, 2007). According to Teece (2007) addressing opportunities include improving and maintaining technological competence and complementary assets. When the opportunity is fully-developed and is likely to achieve marketplace acceptance, heavy investments in that technology and design are required (Teece, 2007).

In seizing, in addition to choosing when, where, and how much to invest, specific business model that defines investment priorities and commercialization strategy must be selected.

This includes selecting product architectures and business models to define the way by which organization delivers value to customers, persuade customers to pay for value, and convert that to profit. In addition, organization needs to select enterprise boundaries, manage complements and platforms, and avoid bias, delusion and hubris. (Teece, 2007)

Day & Schoemaker (2016) see that there are three types of options in seizing; preserve and protect options, scouting options, and exploratory options. They present that preserve and protect options mean developing experiments of different strategic options to respond to competitive moves, shift in market requirements, or surprises in the economic climate in context where the market and technology spaces are familiar and uncertainty is manageable. Scouting options are continuous investments to find new technologies in uncertain environment (Day & Schoemaker, 2016). Exploratory options are small experiments that minimize fixed investments until the commercial feasibility is established to sufficient level and provide experience for larger strategic commitments later on (Day & Schoemaker, 2016). These three different options show well that seizing should be customized to the current situation and organizations need to adapt their ways of working to seize efficiently.

In seizing, a challenging part is how the new opportunities are seen and compared against the organization's old products and processes since changing the way an organization works can threat the position of some employees or business units. New opportunities can be defeated by the managers of established product lines if biases are not notices in investment decision processes (Teece, 2007). Emotional commitment to new opportunities increases the probability of seizing the opportunity (Hodgkinson & Healey, 2011) and thus organization should be aware of biases. Especially in financing, the managers of established product lines can starve the new opportunities (Teece, 2007). Strong leaders can be able to overcome such tendencies but organizations which are lacking strong leaders can fund their programs in persistent manner and following from the presence or influence of advocating managers in the resource allocation process (Teece, 2007).

Seizing can also be weakened by the risk avoidance in the organization which decreases investments the organizations makes. The existing established assets, routines and several layers of decision-making procedures increase unwillingness to take risks (Teece, 2007).

This can lead to bias in decision-making and decreases the probability that incumbent organizations would create radical innovations (Teece, 2007). Avoiding risks can increase the possibility of disruptions by new entrants or competitors and thus organizations should try to take more risks. To remove restricting of addressing new opportunities due to being afraid of high risks, organizations should learn to use probe-and-learn approach and do several smaller initiatives since it can help to balance the risk and reward (Day & Schoemaker, 2016). Organizations should also increase tolerance of failure to remove risk avoidance and to make it acceptable to test a new opportunity of which success is uncertain (Day & Schoemaker, 2016). Doing more initiatives with the possibility to fail makes it easier to also find the most promising opportunities to develop further and ease adaptability to the environment.

Use of cognitive capabilities can support strategic investments and business model design in seizing (Helfat & Peteraf, 2015). Good problem-solving skills can help managers fit together different features of a business model and aid in investment decisions (Helfat & Peteraf, 2015). Especially, reasoning which takes several alternative options into consideration can be helpful (Helfat & Peteraf, 2015).

Since seizing includes improving technological competence, and complementary assets and heavy investments, its role in the development of the organization is significant. To gain advantage over competitors, managers should proactively develop unique capabilities instead of just matching competitors' capabilities (Jantunen et al., 2012). According to Jantunen et al. (2012) seizing capabilities differ more between companies inside an industry than sensing capabilities. In addition, there are heterogeneity between managers' cognitive capabilities which might lead persistent performance differences between organizations (Helfat & Peteraf, 2015). One reason for differences in cognitive capabilities can be differences in learned expertise (Helfat & Martin, 2015).

Even though the previous research of seizing capabilities is scarce its meaning to organization's adaptability is significant. The role of seizing is increased by the fact that it is a mediator; most of the information from sensing is processed by seizing before the reconfiguring (Maijanen & Jantunen, 2016). However, organization's internal politics, lack of resources, or unwillingness to take risks can weaken seizing. Thus, especially

information and models of analytical processes which removes biases would be valuable for organizations.

2.2.3.3 *Reconfiguring*

Teece (2007) presents that the third component of dynamic capabilities and the key to sustain profitable growth is to manage threats and reconfigure assets and organizational structures as the environment changes. Reconfiguring internal and external competences was already in significant role in the definition by Teece et al. (1997) and seen as a learned organizational skill. Reconfiguration can help to keep evolutionary fitness and to avoid unfavorable path dependencies (Teece, 2007). One part of reconfiguring is changing organizational routines which will not happen instantaneously (Teece, 2007). Changes in organization can often create resistance and unwillingness to change which might be more strongly present in reconfiguring than in two previous dynamic capabilities. If the organizational culture is not used to internal change, changes from routines create heightened anxiety within the organization (Teece, 2007). In incremental innovations, routines and structures can be adapted gradually (Teece, 2007). The more often reconfiguring is done, the easier it is to accomplish (Teece et al., 1997). Decentralization and near decomposability, managing co-specialization, and learning, knowledge management, and corporate governance can help reconfigure and properly address new opportunities (Teece, 2007). Also, separating funding for new initiatives can encourage to transformation by ensuring that losses from the initiatives are not carried by an established business unit (Day & Schoemaker, 2016).

The way how decision-making is organized can affect reconfiguring. Teece (2007) sees that with centralized organization structures, top-down decisions become easily isolated from the marketplace realities. Structural rigidities created by the systems and rules in the organization weaken customer and technological responsiveness. Thus, organizational structure should be decentralized because it brings top management closer to new technologies, customers and the market (Teece, 2007). Also, separating units dedicated to pursuing new initiatives that differ from organization's traditional business can

generate flexibility and entrepreneurial dynamism and help developing new business (Day & Schoemaker, 2016).

In addition to the organizational structure, organization's cognitive capabilities and current business model can affect the capability to transform. Teece (2007) claims that incumbent organizations easily frame new problems similarly to organization's current knowledge, assets, and established problem-solving heuristics and business model. This can decrease the capability to address opportunities and potential innovations when organizations do not properly recognize them. In addition, incumbent organizations tend to narrow search activities to innovations that are close to their existing asset base which can prevent seeing radical innovations (Teece, 2007). To create transforming capabilities, organizations should aim for agile, entrepreneurial mindset (Day & Schoemaker, 2016). Organizational cognitive capabilities are also needed to decrease resistance to change. Organizational trust enhances dynamic capability, adaptability and coordination among members in the organization and can thus decrease the challenges in reconfiguring (Fainshmidt & Frazier, 2017). In addition, the likelihood of strategic transformation is increased if the organization has capacity to regulate identity-based affective responses to change (Hodgkinson & Healey, 2011).

Leadership skills and managers' dynamic capabilities are important in creating change to the organization and sustaining dynamic capabilities. To minimize internal conflicts, semi-continuous asset orchestration and corporate renewal that includes redesigning routines is a significant managerial function in reconfiguring (Teece, 2007). This asset orchestration should ensure that old and new is aligned that can cause co-alignment, realignment or redeployment of assets (Teece, 2007). Other individual capabilities managers need for supporting reconfiguring and to overcome resistance to change are good communication skills and social cognition (Helfat & Peteraf, 2015). Social cognition skills can help convincing members of the organization to cooperation and understanding of how members of organization view change (Helfat & Peteraf, 2015).

Reconfiguring capabilities of individual managers differ (Helfat & Peteraf, 2015; Helfat & Martin, 2015). Changes in employees, organizational structure, and physical assets can be influenced by internal power and good access to external resources that individual managers have (Helfat & Martin, 2015). In addition, prior knowledge, communication

skills, and social cognitive capabilities differ across managers. (Helfat & Martin, 2015; Helfat & Peteraf, 2015). Heterogeneity of reconfiguring capabilities can result in performance differences between organizations (Helfat & Peteraf, 2015).

Having managerial dynamic capabilities is not enough and the dynamic capabilities top management has had to reconfigure to ensure effective dynamic capabilities (Kor & Mesko, 2013). This makes the choice of managers significant for the organization's success and creates a lot of pressure for individuals. However, Kor & Mesko (2013) found that the effective configuration of senior management team dynamic managerial capabilities can affect to CEO's dynamic capabilities. That can improve organization's possibilities to adapt and decreases the meaning of one person.

Meaning of transforming and reconfiguring is high in the organization since it affects to it widely. It is also clear that changes to e.g. organization's structure, governance, and specialization are harder to reverse than actions made in sensing and seizing. Thus, either positive or negative meaning to organization's performance is quite certain. Reconfiguring affect more strongly to the employees of the organization than sensing and seizing and thus create different challenges in the organization. These challenges can be difficult to overcome but reconfiguring can create real change to the organization and thus should be done eagerly but carefully.

2.2.4 Conclusion of dynamic capabilities

Even though the definition of dynamic capabilities varies, it is seen that dynamic capabilities are a way to respond to the fast changes in environment. Part of the research also presents that dynamic capabilities improve organizational performance and can bring competitive advantage (Teece et al., 1997). However, it is important to notice that all capabilities are not dynamic. Dynamic capabilities operate to extend, modify or create ordinary capabilities (Winter, 2003).

The previous research has presented that dynamic capabilities can be divided to sensing, seizing and reconfiguring to explain the organization-level competitive advantage over time (Teece, 2007). These capabilities are needed to direct financial resources consistent

with marketplace needs and imperatives (Teece, 2007). Previous literature shows that all of these capabilities have significant challenges and require organizational processes and cognitive capabilities to support the. In Table 1, I will present a conclusion of sensing, seizing and reconfiguring capabilities presented in previous research to see how organizations can use them to support adaptation. The conclusion is based on the literature of sensing, seizing, and reconfiguring capabilities and particularly on Teece (2007) theory.

	Sensing	**Seizing**	**Reconfiguring**
Definition	Scanning, learning, creation, and interpretive actions to notice and shape opportunities and threats in environment	Addressing opportunities through new products, processes, or services, includes selecting business models	Changing and reconfiguring organizational assets and routines to maintain competitiveness
Used processes	Hypothesis development and testing	Relating to investment decisions, preserve and protect, scout, and explore	Top-down or decentralized decision-making
Needed cognitive capabilities	Use of intuition, learned knowledge, pattern recognition, well targeted attention, and empowering everyone	Good problem-solving skills and reasoning	Leadership skills, communication skills, social cognition skills and reconfiguring managerial capabilities
Most important challenges	Bias and unsuccessful pattern recognition due to falsified experiences	New opportunities' role against established solutions, bias and risk avoidance	Resistance to change and other inertia in the organization
Effect to organization's performance	Indirect effect to performance, require alignment to seizing	Direct and also significant role due to being mediator	Direct effect through changes which are hard to reverse

Table 1: Conclusion of previous literature of sensing, seizing, and reconfiguring capabilities

The conclusion of previous research of Teece's (2007) model in Table 1 present that cognitive capabilities in dynamic capabilities has more research than used systematic organizational processes. Especially, the analytical ways to evaluate opportunities and the reasons why the opportunity should move to the next phase in the process are not studied. This gap in the research can be caused by lack of research or that the organizations do not have systematic processes and analytical evaluation models for new opportunities. In the latter case the decision-making can be subjective which easily leads to biases and dependency of individuals and can negatively affect to the performance.

Previous research of the dynamic capabilities also shows that even though the sensing capability might not bring concrete changes or results, its meaning to the organization's

performance is significant. Sensing affects indirectly and especially through seizing to which it should be tightly aligned.

Teece's (2007) model is relevant for my study because it presents well what organizations do to adapt their strategies to fast-changing environment. The capabilities presented in the model are so general that they are not bound to specific kind of industries or organization types. Thus, the model is suitable for my research in which the research context is digital strategy and not a specific industry or individual case organization. In my research, I will use the model as an organizing theory because it is widely acknowledged, and it organizes adaptation well into a form which is easy to understand and explore in interviews. Teece's (2007) theory is also good for me due to the similarities with digital strategy literature. Digital strategy literature emphasizes e.g. new ways to the digital innovations work which resemble seizing capabilities and changes to the organization which resemble reconfiguring. Also, it is seen in digital strategy literature that adaptation is not about technology but organizational capabilities which support the idea of dynamic capabilities

2.3 Conclusion of literature review

In this literature review, I have shortly presented research of digital strategies and dynamic capabilities and how they support organizations' adaptation to the fast-changing environment. By having digital strategies, organizations aim to create value by digitizing analogical processes and by creating new digital innovations. Organizations can concentrate on achieving operational efficiency by digitizing processes in the beginning of digital transformation but in the long-term organizations should also aim to create digital innovations in order to answer to the market disruptions. By creating digital innovations, organizations can create differential value to their customers which cannot be created just by improving the efficiency of operations and they can support adaptation to the changes in environment.

In addition to having digital strategy, organizations should reassess and adapt their digital strategies. Previous research presents that dynamic capabilities can be a source of

adaptability and improved performance. The model from Teece (2007) presents that dynamic capabilities can be divided into sensing, seizing, and reconfiguring capabilities. Sensing includes detecting and shaping opportunities in environment. Seizing means addressing opportunities through organization's products, services, and processes, and can include selecting organization's business model. Finally, reconfiguring means changing and reconfiguring organizational assets and routines to maintain competitiveness. In all of these capabilities, organizations can utilize cognitive skills and analytical processes to implement them.

In this thesis, I will study the adaptability of digital strategy by using dynamic capabilities as an organizing theory. The previous research of digital strategy from the dynamic capabilities perspective is scarce and the research does not present what kind of cognitive skills and analytical processes are used to adapt digital strategy. Overall, the analytical processes used to support sensing, seizing, and reconfiguring are not widely researched.

3 METHODOLOGY

In this chapter I will present the methodology used to conduct the empirical research for this thesis. I will provide information how the data collection and analysis was done and why those methods were decided to use. Furthermore, limitations and other considerations relating to conducting the research are presented.

3.1 Overview of the research method

Qualitative approach is chosen for my research and it is suitable because the previous research of the topic is still modest (Eriksson & Kovalainen, 2008). Qualitative method provides more detailed data and holistic understanding of the unknown topic and the interviewees can also share information of new topics which previous research or my background interviews did not reveal (Eriksson & Kovalainen, 2008). In addition, qualitative research conducted by interviews is also more flexible than quantitative methods and the interviews can be partly customized for every situation to ensure more comprehensive data collection.

The onto-epistemological starting point of my research is critical realism. According to critical realism, truth is more than just the stated yet it cannot be absolute and there is world independent of human consciousness (Eriksson & Kovalainen, 2008; Johnson & Duberley, 2000). In my research, I see that the organizations and their digital strategies exist on their own without human consciousness but the knowledge of capability to adapt is socially constructed. As Hirsjärvi & Hurme (2008) explain, all interviews are created in co-operation between interviewer and interviewee and thus part of my research is socially constructed.

3.2 A multiple-case study

The goal of my research is to fill the gap in previous research relating to digital strategy and bring new information. The chosen method for the study is a multiple-case study due to its suitability for new research areas with limited previous research (Eisenhardt, 1989). Case study method is also suitable for new theory building (Eisenhardt, 1989). Use of case method is supported by the concentration on contemporary events and not historical (Yin, 2009) that is the case in my research. Digital strategy is a current topic to which some of the organizations have not even reacted yet and thus I am interested of what organizations are currently doing. The case study method also suits my research question well since it is suitable for answering research questions like “how” and “why” (Yin, 2009).

My thesis aims to provide general information of how large organizations in Finland are adapting to the changes in environment and see if there are some similarities or differences. I will use multiple case study to get more general level information of what organizations do instead of concentrating on a unique case which differs from others (Eriksson & Kovalainen, 2008). Concentrating on one case company would offer only organization specific information, which could not be used in other organizations and would highly depend on the organization’s digital maturity. Extensive case can support in investigating, elaborating, and explaining a phenomenon (Eriksson & Kovalainen, 2008) that is also the goal of my study.

In my research, the individual cases have only one interview which does not bring as in-depth information as usually aimed in multiple case studies. However, it was a conscious choice with the aim to increase the number of cases and to ease the access to the organizations. Having high number of cases was seen relevant for my study to get better picture what could be the different ways to adapt digital strategy and to see the differences in there. Higher number of cases also mitigate the risk that the participating organization would not yet have experiences relating to digital strategy work that would significantly decrease the quality of data. In addition, gaining access to case organizations was easier when they needed to participate to only one interview, but they would get information of what other large organizations are doing. Of course, building a case based on only one interview has limitations which are discuss in the Limitations and other considerations, section 3.6.

3.3 Sample selection

The goal of the research was to study organizations' actions relating to digital strategy that requires that organizations have taken digitalization as part of their strategy. Thus, the organizations for the research are chosen based on theoretical and not random sampling to focus efforts on theoretically useful cases (Eisenhardt, 1989) that also defines the context of the research. The organizations were chosen based on that they were Finnish so that they would do most of their strategy work in Finland to enable access to the persons participating to organization's strategy work. They also had to have a Chief Digital Officer, Chief Technology Officer or Chief Information Officer, or some similar title in their executive group. Having an executive responsible of digitalization and technologies shows organization's interest towards having value creating digital capabilities. Participating organization had to have at least 500 employees and be at least 10 years old to rule out small organizations, which do not have rigidities and burden from their large size or have not experienced significant changes in technology and environment due to their short existence. Adapting to the changes in environment can be more difficult to the large organizations than small due to, for example, their complicated structure, legacy information systems, and more established culture. Also, new initiatives can be slower and more expensive to implement due to their large size. All the

participating organizations fulfilled these criteria, except Organization A, which is less than 10 years old. However, Organization A was merged from three different organizations which all were over one hundred years old and thus it has the same challenges to change than organizations which are over 10 years old.

To gain access to interviews, 17 organizations fulfilling the criteria were chosen and contacted. There would have more than 17 organizations fulfilling the criteria in Finland, but the chosen organizations were selected based on having access to interview a senior executive in charge of digital transformation or strategy making. From the 17 organizations contacted, 11 agreed to participate to the study which slightly exceeded the initial goal of 10 cases which was the upper limit of Eisenhardt's (1989) suggestion of 4-10 cases. One person was interviewed from all of the organizations, meaning total 11 interviews. The results of the study were shared with participants to increase their willingness to participate. Organizations interviewed are presented in Table 2. Anonymity was promised to all interviewees and their organizations. Thus, the information of participants in presented anonymously.

Organization	Industry	Number of employees
A	Education	1 000-5 000
B	Healthcare	5 000-10 000
C	Energy	5 000-10 000
D	Chemical products	1 000-5 000
E	Retail	Over 10 000
F	Financial services	Over 10 000
G	Retail	Over 10 000
H	Media	1 000-5 000
I	Retail	Over 10 000
J	Software	500-1 000
K	Industrial products	Over 10 000

Table 2: Case organizations

All of the interviewees had participated to strategy making in their organizations and usually in a leading role. Majority of the interviewees were also leading their

organizations digital strategy work which offered a great starting point for the data collection about digital strategy. Getting access to persons who have participated to the development and prioritization work relating to digital strategy ensured that the persons have their own experiences of the strategy work that makes the data more reliable and improves its quality. Information of the interviewees' titles in the organizations is presented in Table 3. The information of the interviewees is presented separately from the case organizations to ensure anonymity.

Title	Number of interviewees
Chief Information Officer or Chief Technology Officer	4
Chief Digital Officer	2
Chief Transformation Officer or Lead of Digitalization	2
Head of Strategy Development or Head of Business Line	3

Table 3: Titles of interviewees

3.4 Data collection methods

Data collection for my research included semi-structured interviews as the primary data, background questionnaire to give better understanding of the organizations' situation regarding to digitalization, and background interviews to support planning data collection. Also, some secondary data was read from the internet before the interviews to understand better the case organizations.

The primary data collection was done by semi-structured interviews with pre-defined interview guide. When using interviews, the interviewee can freely bring out the matters important to him or her and is suitable for unexplored topics (Hirsjärvi & Hurme, 2008). As Bernard (2011) presents, semi-structured interviews often have an interview guide with open-ended questions covering pre-defined list of topics that was also in my research. The same interview guide was used in all interviews to collect comparable data systematically. However, using semi-structured interviews provided an opportunity for customizing questions and asking clarifying questions based on what interviewees told to get more detailed information. Asking follow-up questions provided a possibility to

explore in detail new topics arising during interviews. Semi-structured interviews were suitable for me also because I am interviewing high-level persons with whom I have only one chance to have an interview (Bernard, 2011).

The model of inquiry in my research is inductive. According to Eriksson & Kovalainen (2008), in inductive research the theories are results of empirical research and not the first source of knowledge. In my research, I will use Teece's (2007) theory to organize my research questions and data collection but the data analysis is not bounded to Teece's theory. The collected data will be analyzed without the Teece's theory to see how organizations adapt their digital strategies and to leave the room for new theorizing. After analyzing the data, it is compared to the previous literature of dynamic capabilities.

To create better understanding of the topic to support designing the study, background interviews were conducted before planning the data collection. Pilot studies can be used to refine data collection plans and conceptual clarification for the research design (Yin, 2009). The background study included three informal one-hour interviews with persons who are familiar with the topic and collection of available academic and non-academic material online. The background interviews included discussions relating to what the interviewees saw to be the most important questions concerning digital strategy and its adaptability, what kind of actions organizations are doing to increase adaptability, and what are the main challenges for adaptability. Two of the interviewees had participated in digital strategy processes both in two different organizations and the third interviewee was a consultant working with digital strategies and information systems. One of the persons interviewed to collect background information was also interviewed for the primary data collection. The background information interviewees were not taped or transcribed because they were not used to collect primary data. As Yin (2009) explains, the pilot study reports differentiate from the actual data collection and are mainly to help investigators and should be explicit about the lessons learned.

The information collected during the background interviews and from the online materials were used to formulate research and interview questions. With the background study, a useful iteration was added to the research process, in which I could collect the more basic information of the research topic and that allowed me to concentrate on more detailed topics in the main research (Eisenhardt, 1989).

The interview guide was formulated before contacting any organizations to participate to ensure getting a clear focus for the research that is emphasized by Eisenhardt (1989). When formulating the interview guides for the primary data collection, I used Teece's (2007) theory of dynamic capabilities as an organizing theory for my interview structure because the theory explains the creation and use of capabilities to adapt. In addition, my background study confirmed that organizations at least to some extent follow elements of Teece's (2007) model when developing new digital capabilities. Teece's (2007) theory present three high level categories of dynamic capabilities: sensing, seizing, and reconfiguring. Based on these categories, three parts are created to the interview structure; changes in environment and how they are followed, actions to exploit new possibilities, and changing the organization and its digital capabilities. However, I did not follow the subcategories or use Teece's (2007) terminology in the interviews or in the interview guide to make the terminology more familiar to the interviewees and to follow inductive research model. The interviews were not testing any specific hypothesis that supports inductive research and keeps theoretical flexibility (Eisenhardt, 1989). As I did not follow any theory directly, I could also emphasize the topics which were seen meaningful for my research context based on the background interviews. Interview guide is presented in Appendix 1. However, for the interviews, the interview guide was translated to Finnish.

The role of the interview guide was to ensure that all the pre-defined topics were discussed in all of the interviews to make the data collection systematic. The interview guide also communicated to the interviewees that there are three different topics which the interview aims to cover and helped making sure that all the different topics got enough attention.

Using qualitative research and semi-structured interviews allow more flexibility to the data collection. Based on the comments and experiences in the first interview, some questions were added to the interview guide and one was clarified. These changes did not decrease the comparability of the data because they were already included in the first interview, for example, in the form of clarifying questions. Rather, these changes increased the quality of data because they helped the intelligibility of the questions and provided good new questions to explore. Thus, these changes decreased the risk of bias due to poorly articulated questions in interviews (Yin, 2009).

During the interviews, I aimed to create as friendly atmosphere as possible to encourage open discussion and to avoid reflexivity meaning that interviewee tells what he or she expects that the interviewer wants to hear (Yin, 2009). The goal was to keep interview questions open and avoid leading questions to ensure that interviewees tell experiences and examples they see meaningful for their organization. However, in some situations interviewees asked elaborations to the questions and those were provided to make sure that the interview stays on topic. During the interviews, I asked follow-up questions to discuss in more detail about new topics and to remove response bias (Yin, 2009).

Even though the questions were pre-defined, the wordings on the questions were partly altered based on the background questionnaire and to encourage storytelling. Part of the organizations indicated in the background questionnaire before the interview that they do not have specified digital strategy since it is embedded in their business strategy and in those situations the interview guide was changed to discuss, for example, about digitalization in strategy instead of digital strategy. During the interviews, the questions were not always asked in the same form as in the interview guide to ensure smooth flow of the conversation and possibility to continue the previously discussed story. However, the interview guide was always handed to the interviewees during the interviews which ensured that the interviewees were able to see the pre-defined wordings of the questions.

To conduct the interviews, one-hour slot was booked for each interview because the business world is used to one-hour meetings and I believed that it could be difficult to book longer times from busy executives. The interviews were conducted in Finnish since all the interviewees were native Finnish speakers. This ensured that the interviewees could express themselves as well as possible to increase the quality of interviews (Hirsjärvi & Hurme, 2008). To the findings chapter of this thesis, I have translated the quotations from interviews from Finnish to English in the way that they would transfer the original message as well as possible. All the interviews were held in the premises of interviewee's organization for the convenience of participants. All the interviews were recorded with interviewee's consent. After the interview, the interviewees were offered the possibility to be in contact to me if they had any questions regarding to the study or they wanted to comment or discuss about their previous answers. Interviews were conducted during March and April 2018.

In addition to the interviews, a short background questionnaire was conducted before the interviews to use the time during the interview as effectively as possible. The questionnaire provided background information of organization's digital initiatives and attitude towards changes in environment to better understand organization's situation. The questionnaire was sent to the participants beforehand and they were asked to fill it before the interview. The questionnaire was filled in the beginning of the interview if the interviewee did not have time to do it beforehand. It was kept short in purpose to encourage filling it in before the interview. The questionnaire provided background information of the case organization which helped understand better the case organizations before the interviews. Also, it enabled to change the way digital strategy is discussed in the interview guide to be more suitable to the case organization's situation. The data collected with the questionnaire was also used to understand better from what kind of context relating to digitalization the interviewees were answering and, for example, did the organizations feel a need to change themselves. The background questionnaire is presented in Appendix 2.

3.5 Data analysis

In qualitative research, it is easy to lose focus in data analysis due to the vast amount of data. To create rigor to the data analysis and to look for the themes in data with a consistent way, I used Gioia method. Gioia method is suitable for me because with it I can look for themes across case organizations and get a better idea what large organizations are doing in general. The Gioia method emphasize that the data should be analyzed systematically and transparently to ensure adequate justification and rigor to the inductive qualitative approach aiming to create new theory (Gioia, Corley, & Hamilton, 2013). The ground assumptions in Gioia method are that the representatives of the organization know what they are doing and can explain their actions and thoughts (Gioia et al., 2013). Simultaneously the researchers are capable to figure out patterns in data and formulate concepts in theoretically relevant terms (Gioia et al., 2013). Gioia et al. (2013) present that rigor to the data analysis can be brought by creating data structures including first order concepts, second order themes, and aggregate dimensions. The first order concepts are categories created based on the codes in the data (Gioia et al., 2013). By

combining and analyzing the first order concepts, second order themes are created to see if they suggest concepts to describe and explain the phenomena (Gioia et al., 2013). Finally, the second order themes are combined to aggregate dimensions (Gioia et al., 2013).

I started the data analysis by transcribing the recordings of interviews. I transcribed the interviews as soon as possible, usually in the next day when I still remembered the interview clearly. Transcriptions of the interviews were done in Finnish and only the quotations used in this thesis were translated to English. The transcriptions were done on basic level by word-to-word except filler words, such as "like", "so", "and", and repetitions, for example "and and" (Tietoarkisto, 2017). Filler words and repetitions were left out to increase the speed of transcribing and because the data analysis is concentrating on what is said instead of how it is said. However, otherwise word-to-word transcriptions were done to ensure that the transcriptions followed what interviewees really said (Hirsjärvi & Hurme, 2008).

After transcribing the interviews, the textual data was coded with the help of ATLAS.ti software. Due to the inductive nature of the study, the coding was not fitted to any pre-existing theory or frame (Braun & Clarke, 2006). Collecting and analyzing data can overlap to make adjustments to the data collection and to speed data analysis (Eisenhardt, 1989; Gioia et al., 2013) and that was also done in my research. I did part of the coding between the interviews to use time efficiently and to get better understanding of the topic. However, I did not do any major changes to the data collection based on the previous interviews to keep them comparable and because I did not see the need to do it.

When all the data was coded, I started to look for themes in the codes. Based on the recognized themes, I created a raw data table in Excel which showed what individual case organizations had mentioned about the themes. The table showed more clearly the differences between the organizations and helped to get to know and analyze the data more closely.

Finally, the data structures were created for the different topics in the research; digital strategy, following changes in business environment, addressing new opportunities, and changing organization. Their own data structures were created to all topics to keep the

rigor in data analyses and make sure that part of the information is not lost due to making only one data structure trying to cover all the topics. The first order concepts in the data structures came from the codes used in coding that were seen the most relevant for the topic. The second order themes were created by grouping the first order concepts and lastly the aggregate dimensions were created base on second order themes. The data structures were altered and improved in iterations with the writing of findings as the findings became clearer. The data structures used in data analysis are presented in the beginning of each sub-section in the Findings chapter.

3.6 Limitations and other considerations

It is important to notice that I did this thesis as a commission for one of the interviewed organization. Because this multiple case study is not concentrated on one or only a few organizations and it is not evaluating their success, the risk of treating one of the case organizations differently is small. In addition, I have taken into account the dual-role of both employee and researcher in both data collection and analysis to avoid any ethical concerns. The interview of my employer was formulated similarly than for other organizations and I did not include information I know but did not come out in the data collection. To ensure informed consent to this commissioned research, I contacted all of the participants personally and explained them what the research is about and to whom I am doing this commissioned Master's thesis research.

One of the limitations of this study is having only one interview from each case organization. Having only one interview from each organization creates a risk that all of the things organizations are doing to adapt their digital strategy does not come out in the interview. This has been taken into consideration when analyzing the results by noticing that the information of case organizations is limited and thus it cannot be said that some way of working or individual organization's operations would be better or worse than others'. However, as mentioned already earlier this was a conscious choice and by interviewing a higher number of organizations the different ways used by organizations can be studied more widely and the research is not dependent on individual organizations.

Another limiting factor in this research is that interviewed persons had a slightly different roles in their organizations that might have affected to their views. For example, some interviewees emphasized more information technology related view and some more business related viewpoint. Because of this, the results of different case organizations are not perfectly comparable, but the results cover different topics more widely.

I also noticed that interviewees avoided to discuss about their organization's weaknesses which partly removed an interesting aspect of the results. Nonetheless, the research should protect interviewee's interests (Gioia et al., 2013) and thus the interviewees were not pushed to discuss topics they avoided.

4 FINDINGS

In this chapter, I will present the findings from the empirical research I conducted for this thesis. The chapter has been divided into four parts based on the themes and results from the data. In all of the sections, I will present the data structure done as part of data analysis that shows how I came to my findings. First, I will go through organizations digital strategies and backgrounds relating to digitalization. Next, I will present how they follow and measure changes in business environment relating to digital strategy. In the third section, I will examine organizations' ways to address new opportunities. Lastly, I will present what kind of changes organizations have done to be digitally more capable and adaptable.

The interview guide for this research was organized based on the themes in Teece's (2007) theory because the background interviews of this research suggested that organizations use actions similar to sensing, seizing, and reconfiguring. Hence, the findings are also partly organized in the same order as Teece's (2007) theory. However, since this is an inductive study and the terms of the theory were not used in the interviews, they are not used when presenting the findings. The relation between the findings of this research and Teece's (2007) theory is discussed in Discussion, chapter 5.

4.1 Digital strategy

The data structure model for digital strategy is presented in Figure 5. In this section 4.1, I will present more closely the four dimensions in the data structure model; different types of digital strategy, digital strategy teams, goals for digital strategy, and digital strategy process.

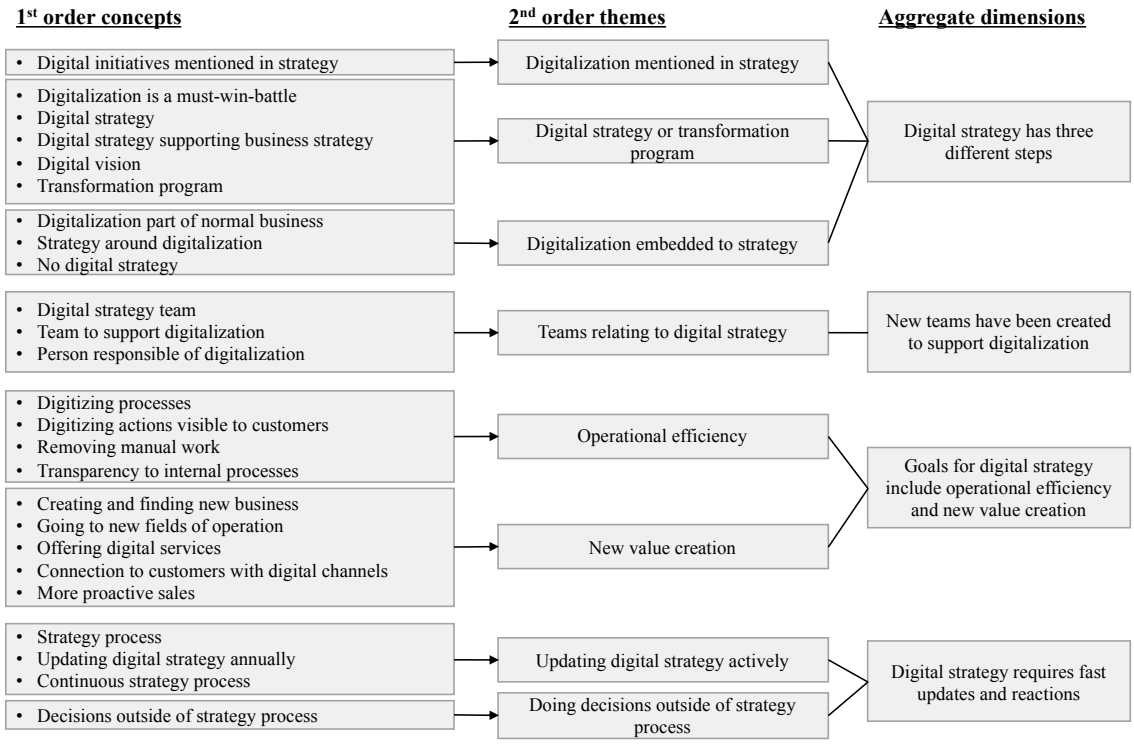

Figure 5: Data structure for digital strategy

4.1.1 Different types of digital strategy

Based on the background questionnaire, we can see that digitalization has affected several different types of industries but some more than others. Four out of eleven organizations felt that digitalization had transformed their industry significantly and three felt that extremely significantly, see Appendix 3. Four organizations said that digitalization has transformed their industry only somewhat. One of the ways to answer changes created by digitalization has been bringing digitalization as part of strategy. However, there are differences in how this is done in organizations.

Even though all of the organizations had taken digitalization somehow into consideration in their strategies, the ways to discuss about digitalization and its opportunities in strategy differed. Part of the organizations had created a specified digital strategy of which role was seen to be supporting transformation in the organization, *"It (digital strategy) is meaningful so that we can get the belief in this organization to it, change management type of reasons."* (Organization D). In Organization C digitalization had been chosen to be one of the transformation programs, *"We took a little example from Kone and our programs (transformation programs) are must-win-battles".* Also, the interviewee from Organization I felt that her position is to lead transformation, "*my title is CDO i.e. Chief Digital Officer which means variety of tasks. So, I strongly feel that this is a type of transformation officer role".* Due to the transformative role, the digital strategy was seen temporary and used for answering to the needs organizations currently have, "*I believe that in five years there might be another theme for change management"* (Organization I). In addition, the digital strategy was seen to support the business strategy, *"our strategy is not built around the digitalization but instead digital has to fit, if we have for example decided go to Asia (business strategy) - - digital is not going over everything but more like supporting".* In addition to just specifying digitalization as its own strategy, some organizations had emphasized digital initiatives even further by naming them as must-win-battles. That was done to emphasize the meaning of this initiative to the whole organization.

Other organizations said that they do not have a digital strategy because digitalization is already so strongly part of their normal business that they do not need digital strategy, as the interviewee from Organization J answered to the background survey "*Digitalization is embedded in our strategy so no need for 'digitalization strategy'"*. Organization K had had a digital strategy few years ago to change organizations assets and partnerships but nowadays it was not used anymore, *"two, three years ago we created a whole organization wide type of top-level strategy which covered aspects like broadly what kind of IT infrastructure we should have, what partnerships we should have. Then we started to look for them. - - But nowadays we do not have a CDO or like that but we more like think that every business' responsibility is to carry out digital regeneration".* Thus, the lack of digital strategy does not mean that the organizations would not be interested in digitalization and new opportunities. These organizations feel themselves already so

strong with digitalization that they do not need to emphasize digitalization with specified strategy. Also, the trend that organizations are using digital strategy to transform their organizations and some have also moved away from it, shows that organizations aim to embed digitalization in their business strategy instead of having separate digital strategy in the long-term. Thus, the organizations which have embedded digitalization in their business strategy are most often more mature with digitalization than those with digital strategy. One organization said that digitalization is something which is mentioned in strategy and promoted but it did not seem that digital would be embedded in strategy.

Type of digital strategy used by organization and information of their digital strategy team is presented in Table 4. Information of the digital strategy was provided by the interviewees in the background survey (Appendix 3) and the type of digital strategy is drawn as a conclusion from the background survey and interview.

Organization	Type of digital strategy	Team to coordinate and implement digital strategy
A	Digital strategy or transformation program	10 members or less
B	Digitalization embedded in strategy	11-30 members
C	Digital strategy or transformation program	10 members or less
D	Digital strategy or transformation program	10 members or less
E	Digital mentioned in strategy	10 members or less
F	Digitalization embedded in strategy	No team
G	Digital strategy or transformation program	More than 30 members
H	Digitalization embedded in strategy	No team
I	Digital strategy or transformation program	10 members or less
J	Digitalization embedded in strategy	No team
K	Digitalization embedded in strategy	No team

Table 4: Type of digital strategy and digital strategy team in case organizations

4.1.2 Digital strategy team

The difference between having a specified digital strategy and seeing it just as a part of normal business can also be seen in having a specified team to coordinate and implement digital strategy. As we can see from Table 4, except to one organization, the organizations which saw that digitalization was embedded in their business strategy did not have a specified team whereas the ones who had a digital strategy had a specified team. Digital strategy team is used for sharing information, organizing incentives centrally, engaging and supporting other units and functions and having specified knowledge and capabilities, e.g. data analytics or agile development methods. In Organization G, the digital team was one of the business units and the unit had been given resources to support others, *"we have done structural solutions and organizational solutions so that we would have capabilities to help other units. In a way we have reserved and we have resources to help".* The team was chosen to support others in digitalization since they had the most knowledge of digital solutions and their development.

Digital strategy team can be its own unit or organization can have a board or virtual team which meets, for example, monthly. When the team is a board meeting regularly, it often includes "digital representatives" from other units across the organization and have a more supporting role. These kinds of teams are also used in organizations which do not have a digital strategy to engage the whole organization to the digital strategy and share experiences around the organization.

4.1.3 Goals for digital strategy

The goals for digital strategy related often to new value creation, *"in all (customer areas) such particular improvement level of basic processes is looked for and also such additional value bringing level"* (Organization A). One source to create value were new product and services models, *"As the first what covers everything is that new business models are searched of course based on digital tools and practices."* (Organization C). As the interviewee from Organization D explains, finding new business and lock-in with customers could be achieved with the help of digital strategy, *"if consider digital strategy, our focus is that how we can bring new business or such customer lock-in with digital*

means". Also, in Organization E had similar customer-centric view, *"there (in digitalization) we bring digital services there to our real customers"*. Moreover, understanding customers better and reaching them proactively with targeted information were seen significant and enabled by digital opportunities, *"perhaps we move from somewhat reactive service method to more proactive which means that we do not only try to digitize the way that traditionally have found the need for doctor yourself and go to the practice and so on but the information is mined from there"* (Organization B).

Another important objective of digital strategy was to improve operational efficiency, *"there are (in digital strategy) these components to increase efficiency, services' digital components and that level"* (Organization A). One popular way to improve efficiency was by supporting employees work with digital tools, digitizing processes and creating the accessibility to information with mobile devices, *"we have already now to this employee's work digitizing so it is such basic thing but then a lot of is done now that from this service you can find a lot of interesting tools which we have applied in the field (meaning their employees serving customers). Such as mini apps are done with PowerApps - - e.g. to compare price information or something else which can be done handy with the mobile phone in the field"* (Organization E).

Efficiency improvements also include digitizing processes in customer service, *"how we digitize our whole end user customer side. There we have done our own applications and such"* (Organization C). Part of the work was also given to robots to improve efficiency and remove manual work, *"robots are doing some simple tasks"* (Organization J). Improving operations and converting from analogical to digital was significant to all organizations which is understandable due to the monetary savings it can bring, for example, in the form of decreased labor costs. Also, improving operations work is an important starting point to other changes in the organization and transforming it digitally. Hence, organizations which were going through digital transformation saw it focal to digitize the basic processes and create foundations for future digitalization. However, it was seen that everything cannot be digitized, e.g. in recruiting. Doing it traditionally brings better results since recruiting requires meeting candidates personally.

4.1.4 Digital strategy process

In general organizations renewed their strategy annually and updated their initiatives for the upcoming year in order to react to the changes. However, organizations also did decisions outside of the strategy process when necessary, *"it is in my opinion that we do not believe that it (strategy) is set in stone and it needs to change"* (Organization A). The strategy was seen to give wider context inside which small changes were possible, *"when we start to make strategy it is good to outline a little bit wider what changes have happened, for example, in the past few years - - but if there is an individual large happening it is important to react immediately"* (Organization F). One of the reasons organizations made decisions outside of the strategy process was the difficulty to forecast the future and include all of the relevant aspects to the strategy, *"I am glad we have not been bolted to it (strategy process) because otherwise we would always be one and half years late. It is damn hard to forecast future so when first characters are started to think, actually already quite soon, what we would do next year so there is one and half years to the end of next year so you have to be quite guru to pick everything from there"* (Organization E).

Instead of doing changes and decisions in the middle of the strategy process one organization used continuous strategy process which is renewed bi-annually to bring adaptability to the strategy process. However, for some organizations the preparations for the strategy process took for six months and thus renewing strategy twice a year could be too laborious for them and not suitable for all. Nevertheless, the challenge is that all organizations are not able to easily do initiatives outside of the strategy, *"when during the year, if new issues emerge I would say that it takes about three months to run through different quarters and try to get that resource"* (Organization B).

4.1.5 Development of digital strategy

Based on the findings, I see that digital strategy and thus also organizations digital transformation develop through three different steps that are presented in Figure 6. In the first step organization mentions digitalization in its strategy but is not a specified concentration area. In step two organization has a digital strategy or a transformation

program to transform the organization digitally. This is often centrally led by a Chief Digital Officer, a Chief Transformation Officer or similar and a digital strategy team. In the third step, organization does not have a digital strategy any more since it is embedded in the business strategy. At this point digitalization is part of business as usual and the responsibility of it is left to business units. Business units are digitally already more mature and concentrate on operations that bring new value instead of solely on digitizing. The goal of all organizations is towards the third step in which they would not have any specified digital strategy, but before achieving it they might need to transform their organizations with centrally led digital strategy program.

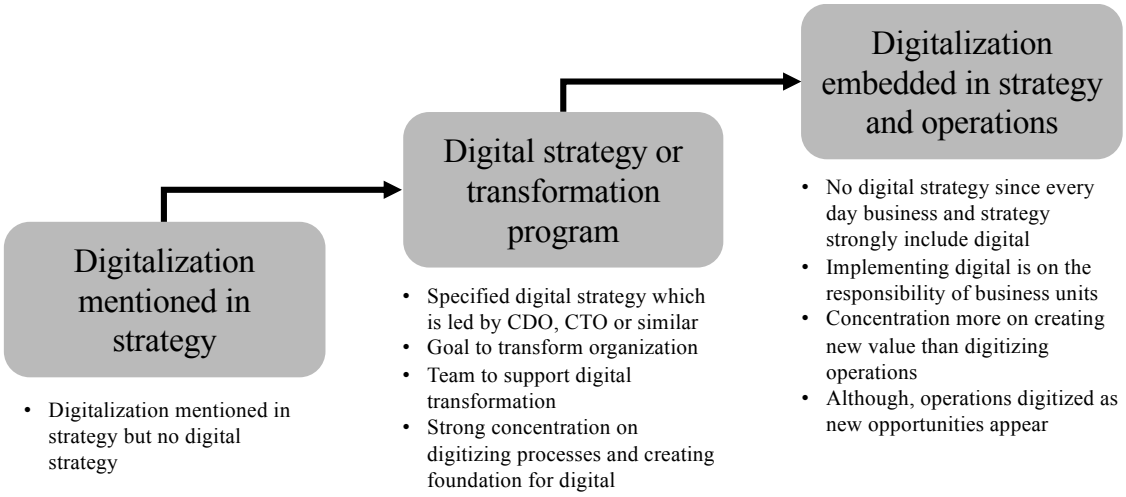

Figure 6: Development of digital strategy

4.2 Following and measuring changes in the business environment

In this section 4.2, I will present the findings relating to following and measuring the changes in the business environment. The data structure for following changes is presented in Figure 7. In this chapter I will present the themes in the data structure; fast changes affecting to organizations, ways to follow changes, roles in following changes, how ideas are collected from the organization, ways to prioritize ideas and opportunities, and about the role of strategy process in following changes. To conclude the chapter, I review how systematically following of changes is done in different organizations and ways to improve sense-making in following changes.

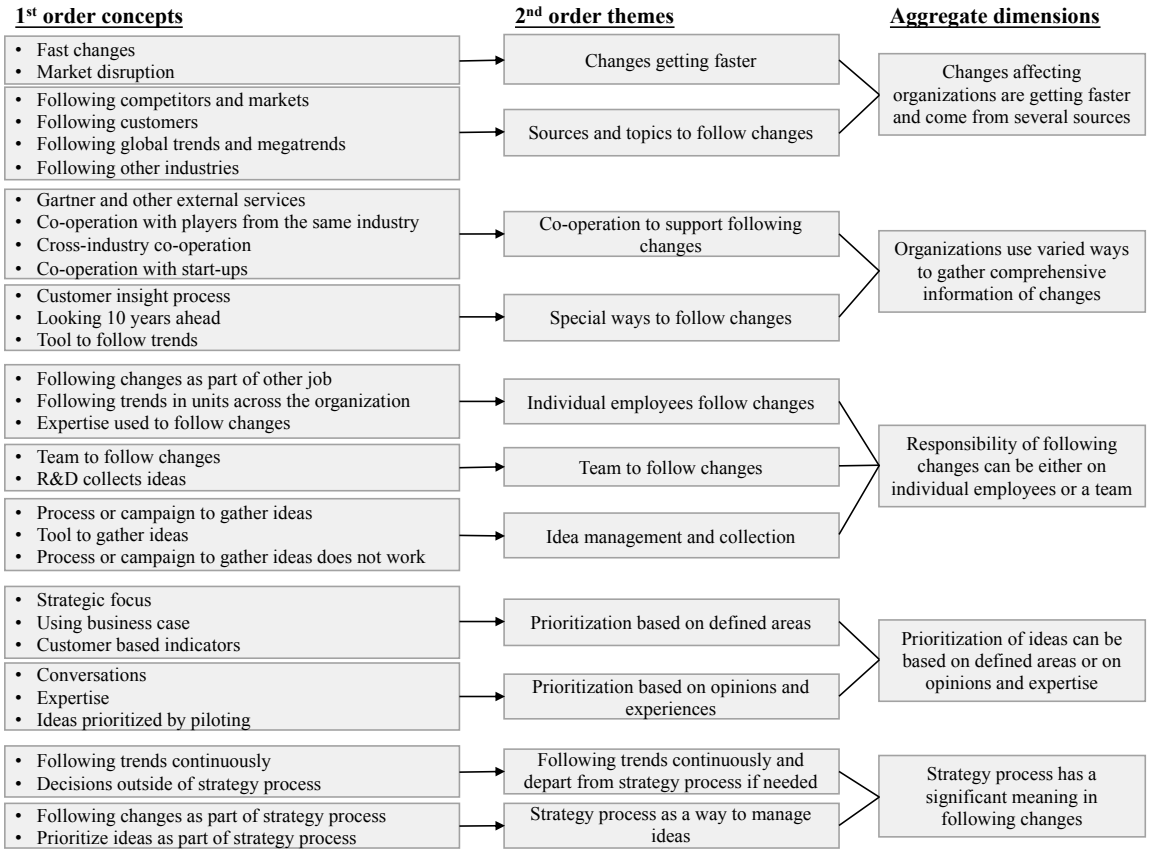

Figure 7: Data structure for following changes in the business environment

4.2.1 Fast changes affecting to organizations

Based on the background questionnaire, 10 out of 11 organizations felt that changes caused by digitalization create threats and opportunities and one organization felt that they create opportunities. This suggests that organizations see the opportunities in changes in the business environment which makes proper following and going through of those changes needed. In addition, those changes can be threats if organizations cannot address them properly.

As mentioned already before, over half of the organizations felt that digitalization had transformed their industry significantly or extremely significantly based on the background survey. Changes happening are not a totally new thing since they have affected already a few years, *"actually it has a longer history. We have seen this digital already for a few years"* (Organization G). However, some felt that now the changes are occurring faster than before, *"so somehow this speed of development has felt to be*

accelerated during the last years" (Organization K). Increasing speed of changes also create pressure for organizations to accelerate their new initiatives and transformation, *"but let's say that schedule pressures have increased a lot. So that kind of things that still a few years ago we thought that we have three or four or five years to build, there is much less time or the pressure is really hard"* (Organization A). Also, it was seen that the fast changes of one's own industry is going to spread to other industries, *"I believe that also these other industries which are not quite yet this far in this digital revolution have to get prepared for that never is going to be as calm as now"* (Organization H). Thus, there are even faster changes in every industry and organizations need to be prepared to react and respond to those.

Even though the changes were seen to get faster, organizations did not discuss much about disruptions. However, Organization H saw that it had happened, *"Well it is, they (global competitors) destroyed the soil, tore it"* and Organization A was pondering if large disruption would happen, *"We are still maybe a little bit studying that is there going to be a large transformation, are universities going to cease to exist for example because there is so much education available online and much is discussed that are degrees going to for example cease to exist because people do not want any more current type of degrees"*. However, Organization A did not see it happening soon, *"We do not see that these core activities are going to totally change yet"*. Even though organizations did not discuss about disruptions, some of them were closely following megatrends, *"We have followed megatrends all the time which have principally started to affect this"* (Organization C).

Organizations had some differences between the changes they felt affecting to their digital strategy during the last year or previous years. Some saw the changes in their own industry and its competition significant whereas others were discussing more of global trends. Global trends were also followed outside of organization's own industry, *"for example this consumer related is this kind of internet coming to homes so how digital comes to domestic appliances and to the devices at home which already exists"* (Organization G). Discussing of global trends can help to notice new technologies and potential disruptions before they arrive to one's own industry.

One source of changes which has created pressure for organizations' digitalization and changing their operations was also noticed to be employees' personal life as a consumer. Employees are used to using latest digital solutions as consumers outside of work and that has also increased their expectations to the digital solutions their employers' offer, *"here are already years that in work life there should be similar gadgets and things in use than in civil life. So, in civil life we have already for a longer time that of course my documents are in some cloud and I can access them with all devices"* (Organization E). Use of digital solutions have also affected B2B customers' expectations, *"this that everything is in consumers' mind, even though we are completely B2B company, so our customers are still consumers in their own life and are used to using all kinds of digital services and they start to expect it also from B2B suppliers and it is clearly one such driver that exists"* (Organization D). That is why organizations need to follow changes all around them and from several different sources instead of just following what main competitors do. Failing to fulfil employees' expectations can lead to losing talented workforce and weaken the company. Thus, organizations need to be adaptable also inside the organization and not just regarding external customers.

One of the changes which organizations saw to be most often important to them was changes in technology, *"well overall these all changes in technology what happens"* (Organization D). Technology was an important because of the new possibilities it enables for organizations themselves and to their competitors, *"that (new technology) is an enabler"* (Organization K).

4.2.2 Ways to follow changes in business environment

Organizations followed trends on their own and with external help, *"we have for example from Gartner or from similar large firms we use services that what they bring"* (Organization C). To improve own capabilities to follow changes some organizations had tools to collect and go through changes in the environment, *"we have tools with which we can piece together different trends and put there our own assumptions"* (Organization C). These tools also included the possibility to add organizations own assumptions of what to expect from the future.

Co-operation within own industry and across other industries were used by some organizations. By co-operating inside own industry, organizations can share their experiences of latest innovations and best practices, *"quite much we benchmark our products to similar player in Sweden (names of products and organization removed). - - We have a lot of active dialogue and they have also done quite much"* (Organization H). Nonetheless, this kind of co-operation with similar players can only work when the organizations are not direct competitors due to for example geographical or language reasons. By sharing information and experiences with organizations from other industries offers new way of thinking how technologies or other new opportunities could be used, *"we have started to look a lot other firms, other industries. We do a lot of co-operation with other Finnish firms (names removed). In my opinion it is something we have not done before. - - We can think 'okay you have done it that way, could we use similar operations model to our business'"* (Organization C). Sharing information across industries can offer organizations information faster than what it would come to organization's own industry. This can ease adaptation to changes especially nowadays when it is seen that new competitor or industry transforming change can also come from other industries than one's own.

A few organizations also did co-operation with start-ups by arranging events like hackathons with them, funding their operations or organizing accelerator programs to support them. Co-operation with start-ups was seen important because some organizations believed that the new technological innovations will be created in start-ups and not by them, *"we follow when start-ups always go ahead of us. We follow technologies and we ponder which of those will affect us in the long-term. - - We do not as such develop or be in the frontline of technology. We only have to understand which we need to use"* (Organization C). It was seen that by supporting start-ups and acquiring them it is easier to follow the developments in technology. Following technology trends through start-ups can increase organization's adaptability since start-ups do not have the legacy or burden that large organizations have and thus there might become innovations organizations cannot create themselves.

Organization I was using customer insight process to better understand customer and how their expectations develop. Organization I had created a customer insight director role

whose tasks was to provide better understanding of customers, *"what does it then mean that a customer is a for example an enthusiastic as a categorization"*. The process was based on data from several sources, *"we have a lot of data of course (of customers) - - and we of course enrich the data from several different sources"*. Organization I believed that with the data they can get an advantage or at least a head start compared to competitors which do not have similar capabilities, *"I would say our quality of data is so special. It is so far developed that we have at least a few years of head start I would say"*.

Organization K differed from others by trying to look foresight for 10 years in the future, *"at the moment we do a project with the lead of my team (strategy) and R&D that looks 10 years in the future. A kind of foresight project. - - Even weaker signals are surveyed"*. In this project they looked into trends also outside of their own industry that might become stronger in the future, *"first we collect signals which mean things which already now are noticed that might mean something. Let's say for example that in China the deployment of social score is considered"*. They collect a few hundred signals after which they combine them in different combinations to see if some themes emerge. Finally, based on the themes they see to which trends they should react, *"then finally from the themes we as if say from three to five trends or changes which we should like… for which we should prepare"*. Looking into also weak signals can help detecting more possibilities than the competitors which follow only the main trends. To evaluate the importance of the signals detected, Organization K trust their employees expertise, use external help and involve employees around the organizations, *"we engage really large part of our organization like through different workshops even 150 persons are involved at the end of the day. It is really typical for our organization"*. Involving large number of people from the organization support exploiting the expertise organization has and the changes employees have notices as part of their everyday work. In addition, Organization K does this every three to five years which ensures that doing foresight of the future is done continuously.

4.2.3 Roles in following changes

Part of the organizations had strengthened their capabilities to follow changes by specifying it to the responsibility of a strategy or some other team, *"we have a team of*

which job is to follow changes in markets, regulation, competitors so such… what is it in English but such following of markets and competitors we do systematically" (Organization F). Nevertheless, assigning a special team to follow changes and developments in markets does not mean that other parts of organization would not also follow them *"well in strategy team we have a global market intelligence which means maintaining portals and collecting news… doing newsletters and collecting data from several sources. - - Then in business lines the same is done"* (Organization G). On the other hand, in some organizations responsibility to follow changes was mainly management's, *"management team discuss a lot and the only formal which exists is that in management team meetings news from the world are told that what have been heard now, what has been seen and what is observed"* (Organization A).

Even though part of the organizations had invested in following changes by specifying a team, the most common way to follow changes was seen to be done by individuals around the organization, *"I believe everyone working with these things do it a bit like as a job that all the time they try to look what is happening in the world, what could be the signals"* (Organization I). The benefit from following trends by individuals around the organization is that then the persons in the business units are more aware of the changes and involved in addressing them, *"it is important in my opinion that it is done at all levels that it is not just me so I try that all other people would do it in their own areas and collect that information and then we can interpret it"* (Organization D). Nevertheless, the risk in leaving the work of following changes to everyone in the business lines is that it might not be done effectively, systematically or comprehensively. If enough time and resources for following changes is not given to employees, following changes and looking into the future is easily forgotten while doing the normal work. Moreover, employees would need to have a clear way to inform others of the detected changes so the work they have done would be beneficial.

4.2.4 Collecting ideas from the organization

To collect ideas and inputs from individual employees, organizations have tested different kind of campaigns or processes for idea collection. One way to do that is to use a tool into

which everyone can submit their ideas. In Organization D, it is seen beneficial to separate the collection of digital ideas from other ideas to make the process faster and more efficient. Employees can also have an opportunity to test those ideas,

"in accelerator program we collect categorically ideas from inside us. - - there is a team which collects ideas from them and collect a team for each idea. We have a boot camp for three days. After that they pitch them (ideas) and there are selection criteria and a jury which collect three or four from them and they get funding. Those teams get then innovation leave and they have six months to prove that it works" (Organization C).

However, all organizations do not want to have a large number of ideas and want to get already more developed ideas, *"of course we have a preparation process so kind of through that process so there would not be an enormous number of ideas at once. So, a little pre-selection is done in the process"* (Organization G). Some organizations have also tried some campaigns to collect ideas, but they have not succeeded, *"we got a few ideas and those were also bad"* (Organization I). Whereas in Organization K which has a team to follow changes, idea collection process was tested but was not seen to be suitable for them,

"let's say that question would be more relevant if we were Google which has maybe 50 000 or x times ten thousand well educated white collar workers that are all the time online and with their computers. We have tens of thousands of people who moves in the field - - they might not even have an email in active use. - - the population from which to get that kind of ideas widely is maybe a little bit smaller. In that sense it is not maybe so good thing for us".

One way to collect inputs from employees is to engage them to the strategy making process. Organization J which have a continuous, bi-annual strategy-making process offers an opportunity for employees to comment the proposed strategic options and propose ideas if they feel that something is missing. This kind of way to collect ideas requires activity and interest from employees but can work in organizations like J which are a little bit smaller and have highly educated employees constantly following new trends.

Even though idea processes can work as a good way to collect input from employees, processes where employees strongly develop and sell their ideas to others in the organization require activity and enough resources and time to do it. Thus, that might not collect all ideas or input of detected changes from less active employees and could be supported with a more easily accessible way to report of changes.

The ideas coming from the organization are even more meaningful due to the fact that customers will not come up with everything they would be interested of, *"in technology products there is often the paradox that consumer might not know if you show some prototype or describe some idea so the answer if this could be useful for me or not so the customer does not always know it"* (Organization G). Thus, organizations need to be proactive and innovative and cannot always count only on customers' input.

4.2.5 Ways to prioritize ideas and opportunities

The decision how to prioritize ideas is often evaluated with strategic focus and potential value to customers, *"we consider that does this relate to strategy and does it remove customer's some basic pain point"* and *"of course is that what matters to customers. We always try to consider so that whether we optimize customer experience or our own business. And then the sub-optimization usually always takes to wrong course"* (Organization I). In some organizations, there were no systematic ways to evaluate ideas and it was done by conversations and expertise, *"at least I have not seen, there are no formal process. It is really only conversations between people but there is a lot of those conversations"* (Organization A). Whereas in Organization C the prioritization is done by piloting, *"we usually pilot. We have piloted during the last two years over one hundred technologies or business cases or any new experiments. It has practically gone more towards experimentation culture than that we would evaluate"*.

4.2.6 Role of strategy process

Studying of the most significant changes and trends for the organizations was often mentioned to be part of the strategy process. Studying of changes and trends was done in

more detail and in more formal way during the strategy process, *"I would say that the formal process (of going through changes) relates to our strategy process"* (Organization F). At the same time strategy process also worked as a way to evaluate and prioritize the ideas. However, as mentioned already before, annual strategy process can be too long and slow for the fast-changing business environment and thus organizations continuously follow changes also outside of the strategy process and were ready to react to them. The role of the strategy process in following changes is also enforced by that following changes continuously can be on strategy team's responsibility.

4.2.7 Overview of how systematically following changes is done

Organizations differed in how systematically and formalized they followed the changes in environment and prioritized the new opportunities. The Table 5 summarizes how systematically different organizations followed changes and what was their main process to do it. As we can see from the table, organizations which did not have processes to follow changes said that the prioritization of ideas is mainly done by conversations. For the ones in which following changes was on the responsibility of business units, also the prioritization was on business units' responsibility and it was unknown how they are done. Even though part of the organizations had more systematic processes to follow changes, such as a team to do it or process to follow customers, the ways they used to prioritize ideas varied widely. Part of them had a prioritization process, such as portfolio process but there is no general way to do it. Reason for that can be that moving from noticing an opportunity to addressing it is done partly unstructured way without clear idea how to do it in the best way.

Organization	Process to follow changes	Ways to prioritize opportunities
A	No formal processes to follow trends, trust on employees' expertise	No formal measures, conversations used to prioritize
B	Systematic processes to collect information of customers	Measured by prioritizing resources to projects and business case
C	Systematic processes and a team to follow changes	Ideas prioritized by piloting
D	Slow moving industry which does not need large actions to follow changes, done across organization	Prioritized with workshops and conversations
E	Independent business units responsible of following changes	Independent business units responsible of prioritization
F	Following changes seen as an important part of strategy process	Prioritized done based on expertise and all available data
G	Following changes embedded into the operations across organization	Prioritization made in portfolio process
H	Independent business units responsible of following changes	Independent business units responsible of prioritization
I	Systematic process to follow customers but not for markets	Prioritized based on customers' or organization's need
J	Following changes seen as an important part of strategy process	No defined indicators but need for them noticed
K	Systematic processes and a team to follow changes	Part of strategy process and engaging organization

Table 5: Overview of how systematically case organizations follow changes in the business environment

4.2.8 Ways to improve sense-making in following changes

As changes in the environment are getting faster and come from an increasing number of sources, following and shaping them become harder. My findings suggest that organizations use different ways to follow changes relating to their digital strategy. However, the different ways to follow changes had different objectives and strengths. In the Figure 8, I present how organizations could make better sense of changes coming from different sources and how the findings can help them. These does not present all the ways organizations use to follow changes, e.g. doing it more closely as part of a strategy process but as ways to improve sense-making from continuous following of changes.

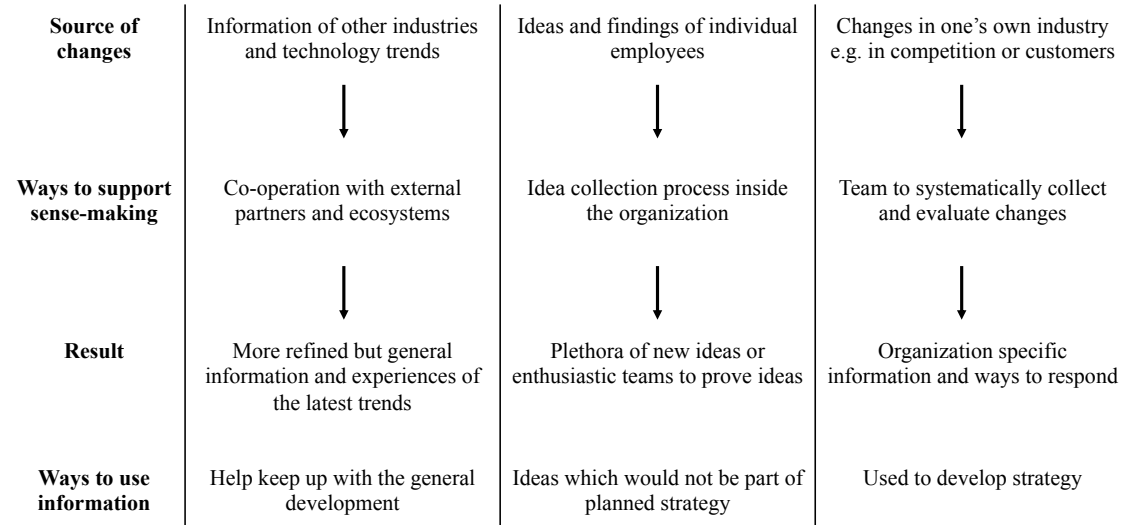

Figure 8: Ways to support sense-making in following changes in the business environment

As my findings indicated, organizations follow changes also outside of their own industry and the general developments of technology. These changes were followed with the help of external partners or ecosystems since the topics were often out of organizations core knowledge. As a result, the information got was more refined but general including information of how others had used the technology and not organization specific. The information got can help keep up with the general development but does not bring significant advantage compared to others since the partner telling the information usually shares it with other organizations too.

Organizations saw that a significant part of following changes is done by their employees as part of their normal work. To collect their findings and information, idea collection process inside the organization is needed. With that organization can get a large number of ideas or even enthusiastic teams to pilot ideas in the case that employees can develop and prove their ideas. However, in both cases the organization can get information that it might not get from externals or management leading following of changes since the crowd collecting information is large and have different points of view.

A third way to support sense-making of changes is to use a team to do it. Usually the team would follow changes relating to organization's own industry, competitors, and customers because from those the organization have a lot of knowledge. The information collected by the team differ from other information since it can be highly organization

specific and provide ways to respond to the changes. This type of information is often used to develop organization's strategy.

4.3 Addressing new opportunities

The data structure for addressing new opportunities is presented in Figure 9. In this chapter the first dimensions in the data structure is divided into two; differences in piloting process, and methods for agile and adaptive piloting. After that, I will discuss about the next two dimensions which relate to measuring pilots, and scaling and ending pilots. Finally, I will present the process of piloting and how to make it more efficient.

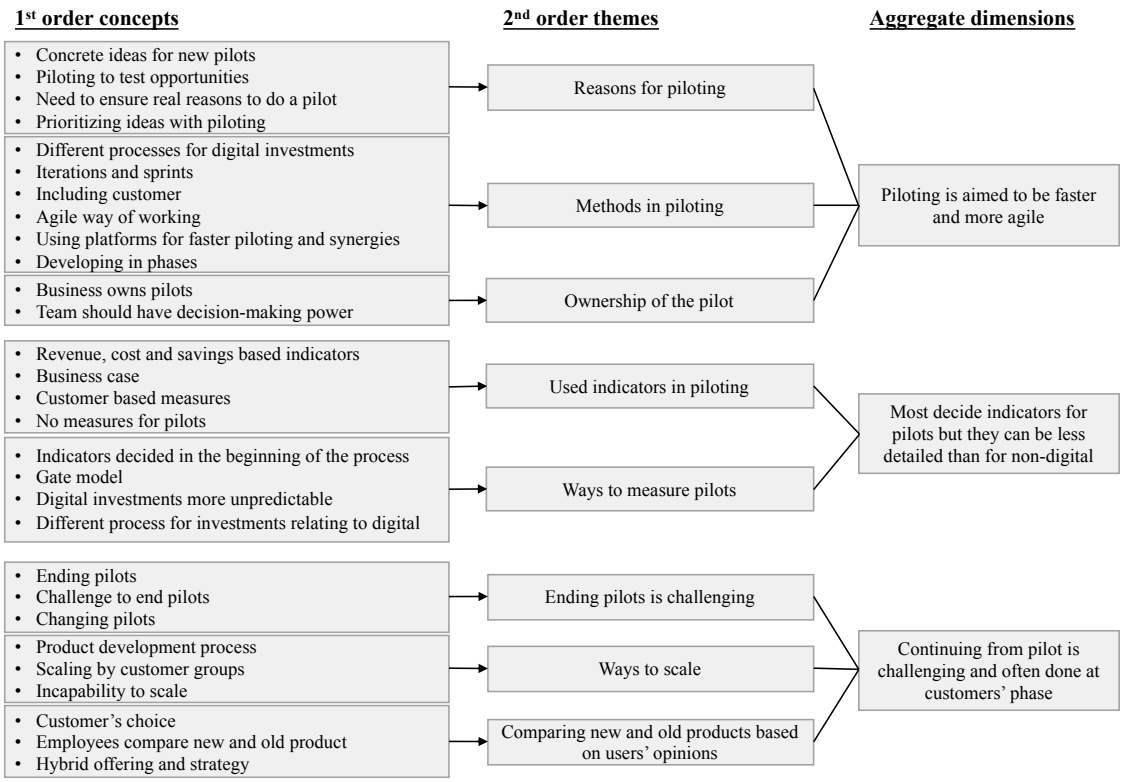

Figure 9: Data structure for addressing new opportunities

4.3.1 Differences in piloting processes

To address the new opportunities detected, organizations usually pilot the new solution and technology. The reasons why and the situations when piloting was used differed between organizations. Some organizations used piloting to test new opportunity's or

technology's suitability for the organization and its need. Based on this kind of piloting organization can choose whether to scale the solution or to end the pilot. However, some used piloting mostly as a way to develop a product which they already had decided to take into use. Usually in these cases organizations wanted to have concrete ideas where the technology could be used, *"if we discuss about artificial intelligence so hey we have concretely some initiative where we do something. Or in robotisation we have in finance some project we develop"* (Organization H). Whereas, Organization C differed from others and used piloting strongly for evaluating new ideas which requires a significantly higher number of conducted pilots.

Despite of the way or reason why the pilot is done, it is important to remember what the purpose of the pilot is and how the organization could benefit from it,

"sometimes it feels that we do pilots more to get something done quickly. That it is not just kind of nicer to do some new solution so that it has steps which are not that concrete but we learn from those steps so that is not always so clear. But it would be ideal that we would have those indicators which would provide us an opportunity to see already during those steps how for example the returns will improve, or do they improve. And then we can refine the direction and implementation during that learning" (Organization F).

The ways to address opportunities also differ between organizations in how systematic processes are used in addressing new opportunities and what do they use in measuring pilots. Table 6 summarizes these differences. As we can see from the findings in the table, a part of the organizations has a clear, systematic ways to do piloting and other development whereas others do not have any defined ways to do them. Of course, even when systematic processes are used, the pilots need to be partly customized every time, but the organization has a clear idea what kind of steps the pilot includes. Systematic way to organize pilots might not be suitable for all of the organizations but all organizations should have a clear idea why and how the pilots are done and what they can learn from them. Without any measures, it can be more difficult to learn from the pilots and compare them and thus they could be beneficial for all. Measuring pilots will be discussed more in the chapter 4.3.3.

Organization	Ways to address opportunities	Ways to measure pilots
A	No systematic process for pilots	Qualitative measures for pilots
B	Systematic process derived from traditional development process	Measured by business case and approvals
C	A lot of new opportunities piloted with customized pilots to find potential ones	Always uses KPIs
D	New way to pilot under development, first actions to support systematic piloting done	Business case
E	Independent business units often responsible of pilots and no exact process to do it	Independent business units often responsible
F	Systematic way with product development process	Business related goals and indicators
G	Clear model for working	Uses KPIs
H	No systematic process	No systematic measures
I	Systematic way to be agile	Uses KPIs
J	No systematic process	Measuring how business grows
K	Piloting is done always to test hypothesis	Have hypothesis

Table 6: Overview of how systematically opportunities were addressed in different case organizations

4.3.2 Methods for agile and adaptive piloting

Organizations felt that the traditional product development process and governance relating to them is not fast and agile enough for digital products and thus they have created different process for piloting of digital solutions than traditional products. Different processes are needed because the needs and expectations organizations are currently experiencing change faster than before and thus organizations need to act faster to adapt, *"if we handle everything similarly than the one hundred million investments then the need is already gone. You would have done the implementation when it has gone through the pipe (governance process). So, the governance is slightly different"* (Organization E). In addition, digital solutions are seen more unpredictable and harder to plan than, for example, investments to factories, *"it (factory investments) is totally different than some digital where you cannot really know what you can get but it can scale for example forever"* (Organization D). Hence, organizations need to do decisions with less information especially when the lack of detailed investment calculations can make the process faster.

To support efficient and fast piloting, organizations aimed to use agile ways of working. Agile way means, for example, piloting the solution in a small scale without considering all the restricting factors in the organization,

"agile testing is that we put a new service into operation very lightly and into use with small amount of people. Optimal would be that in digital solutions they would be at least technically ready, preferably some cloud services which are easy to deploy. Then we would find some enthusiastic group that wants to try it in which case we do not have to already consider all of the heaviness of large organization" (Organization A).

The methods organizations are using in agile way of working are, for example, sprints or iterations in development, *"our basic development model is iterative, so we do the work in these ten-week program increment. - - Ten weeks and then always after ten weeks we review what we have accomplished"* (Organization F). Goals are set for all of the increments so after one increment Organization F does a new prioritization how to continue based on how well the goals were accomplished. Other agile methods used are minimum viable product which means that only the minimum requirements to get the solution running are fulfilled and not all features are added, and proof-of-concept to test ideas. Also scaled enterprise agile framework is used, for example, to give the piloting team the decision-making power of how to use the resources. Then the governance of the project will get lighter when the team does not have to get permission to everything from the management.

Piloting is also supported with new technological opportunities and with better quality data, *"now we have though it (piloting) in our data strategy. In there, we have come to a conclusion that we have to get our platforms and data in order and available so the piloting gets easier and also to make most of our pilots in the same way, like with the same template, to same type of platforms and with same principles. So, if we want to take them to production it is much smaller problem"* (Organization C). By using platforms, the pilots become easier and faster to do and thus also less costly, *"a few thousands (referring to money), a few days, a few weeks so we have launched, in use, to our whole staff if we want some small system"* (Organization E). This provides organizations an opportunity to cheaply and fast test some new opportunity and end using it if it was not suitable and needed. Thus, adaption to the changes in business environment is

significantly eased. In addition, using platforms brings synergies to the development when the same elements can be used in several pilots or products, *"we have created by platformizing kind of these features inside the products. So, when we develop, the same can be taken to several products"* (Organization G).

One of the most important thing in pilots was mentioned to be including customers early on to the process, *"we do nowadays a lot of customer interviews in the early stages even before anything is developed. - - Overall we have done, not actually relating to this (digital pilots), but overall relating to development activities hundreds of customer interviews during the last year, or let's say during the last years, last two years"* (Organization K). This was something which was not done before in one of the B2B sector organizations, *"for our type of industry it is a strange idea to engage customers early on in the ideation process - - we prefer to go with totally ready solution and sell it"* (Organization D).

Another change that organizations which are used to traditional products need to make is understanding that digital innovations and solutions are created in phases, *"there should (about digital solutions) come always new and better but it does not fit to our internal development when we develop them. We do the project and then it is ready"* (Organization D). Developing products continuously can support the use of minimum viable product or other agile methods but requires change in organizational thinking. Organizations need to have courage to pilot products of which final form they do not know beforehand, *"there we could be maybe more agile and brave and trust we can fix it on the go"* (Organization K). Developing phases also increases organizations operational costs which can be unwanted in organizations where most of the development costs are fixed like in Organization D. However, when the pilots can be started very small they do not require large investments and thus they can more easily get funding, *"some small digital nicely sinks to investments. On the other hand, opex which shows in fixed costs should be really lean and mean so it looks bad if there comes more money and this is again one of the challenge because it looks better when it is an investment but that takes again to the project thinking"* (Organization D).

Even when digital strategy was supported with centralized digital strategy team, the ownership of the pilot was preferred to give to the business units unless the piloted

technology was “exotic”. It was also seen that the decision-making power of the pilot should be given to the team implementing the pilot. Giving the power to choose how resources are used lighten the governance and makes the process faster. Also, the pilots can be easier to customize to the individual situation, *“we believe more that the decision-making power should be as low as possible there at people and close to the customers. They will choose the best methods for them”* (Organization J).

4.3.3 Measuring pilots

Indicators of how to measure the pilots is often decided in the beginning of the piloting process. With those indicators organizations can follow how well the pilot is performing and whether it fulfills the goals given to the pilot. Often the measures relate to business goals such as revenue, costs, or savings and very often business case is done before the pilot, *“you have to be able to show estimates of increase in sales or cost savings or both that you aim to achieve with it”* (Organization B). However, due to the higher unpredictability of digital solutions and the aim to pilot faster and in a more agile way, the business cases are lighter and less detailed, *“we have a very complex tool for factory investments which we do not use in IT at all, except if the investments surpass one million which is rare - - even then you can use it lighter and they go to different places to be decided”* (Organization D). Using lighter business case enables larger number of pilots and making pilots faster. As interviewee from Organization E mentioned *“as simplest there is some ten thousand (euros) implementation so there is no reason to make the governance with five thousand (euros)”* that presents well how expensive detailed and full governance for pilots can be and thus they are not done to ensure the possibility to do more pilots.

Other measures used relate to customers such as the number of installations and value to the customer or to the organization. Technology is not measured except measuring the hygienic factors and that the solution works. Using business and customer related figures as indicators instead of technology related presents well the customer-driven mindset organizations want to have. Concentrating on customers is also better for the business since good technology is not enough to bring the sales and profits.

Even though all organizations recognize the need to systematically measure the pilots, some organizations do not do it, *"orthodoxly there should be very detailed indicators in the beginning that these kinds of KPIs we want for example for some speed of processes or easiness or results for customers or other. In best cases we also have those. Then of course in quite many cases it is qualitative that let's ask from guys and that is why the choice of team is important that hey are these persons with vision"* (Organization A). Organization A's view is that qualitative measuring work for them since they are a smaller organization which operates locally. Using qualitative measures can be an effective way to reduce the governance relating to pilots but requires more from the employees as mentioned by the interviewee from Organization A. Employees need to have more expertise and vision of what could be the most relevant for customers, organization and relating to situation in the market. However, transparency of decision-making in the form of clear criteria for decisions were experienced needed by employees in the Organization J when the ideas for piloting are chosen,*" what has been a little funny is that it has been a little bit more free (start piloting) and we think there would have been bigger chances to get the thing through but then we have received feedback that a large part of staff believes that you are not allowed to do something here and like because those principles were not written"*. Thus, the indicators used in choosing what to pilot and evaluating piloting work also as a way to manage the organization.

To support the piloting, several organizations used some type of gate model to review the progress of the pilot and evaluate it. In the gate model, tasks for every phase are defined and milestones are set to review the progress. After each phase in the gates, it is evaluated whether to move on with the pilot or not. Using gate model provides organization a tool to evaluate the usefulness of the piloted solution and ease also ending the unsuccessful pilots, *"in our gate model a decision that these were the results and were these now so good that this can be taken wider into use or not"* (Organization A).

4.3.4 Ending or scaling up pilots

Overall ending pilots fast is one of the goal organizations have in piloting. Pilots which are not ended but do not become full products are problematic for organizations. Ending

pilots and "failing fast" are still challenging, *"for that we also have a general line that we would aim to find early the failures and avoid that we will not do terrible long something that just will not work. - - even though a lot of discussed of fail fast –thinking it is not easy to apply in practice"* (Organization F). One reason is that organizations become fond of their pilots and do not want to end them, *"we fall in love to the ideas and it is really difficult to end them"* (Organization D). Especially in the case when a business unit has invested significant amount of money to the pilot, it can be difficult to end it, *"some large e-commerce might be developed and then it is noticed that this does not fly. - - Well then it will not sell but who has the courage to take it off use"* (Organization A). Another reason is that failing is not allowed in the culture, *"that it would be okay to fail in here, it has not been. Fear of failing is maybe quite deep. - - nowadays it is said as a joke but probably half of it is true that 'guilty must always be found'. That goes to that none wants to try"* (Organization I). Incapability to end pilots can harm the possibility to test new opportunities since the pilots quickly become a burden to the organization and thus also weaken adaptability to the changes in business environment.

Organizations have ended pilots based on technological or customer related reasons and they feel that they should end even more pilots in the future. However, often pilots are well planned and seen so meaningful to the organization that instead of ending the pilots, organizations change them, *"more common is maybe that the direction of the product is changed. - - So, we maybe are not that we would do a huge amount of something and experiment and does it work and only a small number would continue. They maybe are already in the beginning so well though"* (Organization G). Altering and improving pilots is an important part of piloting and can create adaption to the latest changes but can still lead to suboptimal products. Hence, organizations would need more courage to end the pilots if needed. Systematically altering pilots instead of ending them also suggests that piloting is used as the first part of product development process instead of a possibility to test new more certain and less certain opportunities.

Scaling up pilots to full products have pros and cons in digital solutions. In some cases, scaling can be limitless because the solutions do not require similar manufacturing than traditional products but especially the legacy IT systems and organizational capabilities can complicate scaling. Organizations believed that better planning already before the

pilot could ease the challenges they have with scaling. Organization C felt that piloting was easy for them but scaling up to full products was challenging due to the legacy IT systems. To improve the situation, they planned to have a model in which they would already in the beginning evaluate how the pilot would affect to the legacy systems and they would use platforms to support taking the pilot into production. Organization D created a digital hub to bring transparency to what should be already thought before piloting, *"it does not straightly accelerate scaling, but it brings visible already in the ideation phase that we would recognize what should be in place in the scaling phase"*. Some organizations did scaling in a planned way by customer or user groups or business units to ensure scaling to be systematic and controlled.

Some organizations use systematic and defined product development process after piloting. The process can, for example, include prioritization of further development ideas or gate model to review development, *"then this goes to our development and management process where is a lot of development ideas and then they are prioritized that how important this is compared to some other thing, for example, let's say if we would make some new mobile service to some customer segment"* (Organization F). On the other hand, all of the organizations did not use systematic processes, *"it goes… let's say quite surreptitiously… So, we do not have a systematic product development process - - then from there comes at some point that aha figures look good that let's expand this then lo and behold. To caricature it can go like that."* (Organization H). Organization H had experienced that unsystematic scaling processes can have challenges with co-operation across the organization and the presence of a needed unit can be easily forgotten. Organization I also had experienced that sometimes centralized decision-making in scaling can make the process faster in scattered organization. All in all, systematic process can guide organization in product development but also limit its operations.

New digital products and solutions are often overlapping with the old products organizations already have. To manage between the old product and new digital option, organizations often let customers or users choose which they want to use *"they can compete e.g. if it is customer end product then about customers"* (Organization C). However, hybrid offering, meaning that both analogical and digital products are offered

at the same time and also as a bundle, was also seen as a solution when adapting to the business to digital time. Also, when offering hybrid products, it was seen important to progress at the phase of the customer. It was seen that in some cases it might be better to offer the new product only to the most developed customer segments since it is already known that some segments or geographical areas are digitally less mature, *"of course we prioritize where we like… there is no point to bang your head to the wall if some area is more conservative"* (Organization K). Launching the product in steps can ease the scaling but nevertheless be burdensome since the organization needs to maintain two different products and the digital product might need to be updated even before it is launched everywhere. All in all, giving the choice to customers was seen as the best way to compare new and old products since customers' decisions will straightly affect to sales and organization's performance.

4.3.5 Process to make piloting more efficient

Based on the findings of addressing new opportunities, I have gathered to Figure 10 different steps and actions in piloting process. The actions present ways organizations use to do fast and successful piloting of digital solutions and are collected from several organizations.

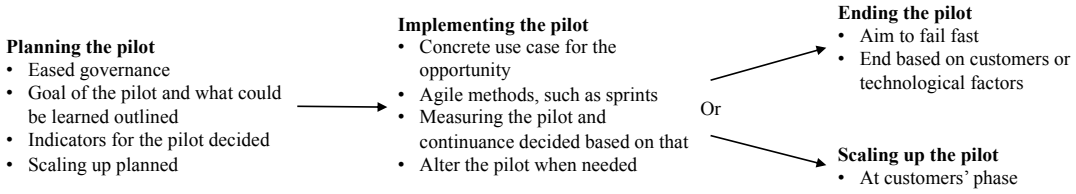

Figure 10: Actions to make piloting more efficient

The figure suggests that organizations are currently thinking piloting as three different phases; planning the pilot, implementing the pilot, and ending or scaling the pilot. The three phases are all related to each other and thus the way to scale the pilot should be already planned in the planning phase. The decision of used indicators also affects to the measuring in the implementation phase and to the decision to end the pilot. Addressing new opportunities is made customer-driven to ensure the concentration on the right

aspects. Moreover, in efficient piloting, the pilot can be ended or altered at any point based on what has been learned.

Based on my findings, the implementation of the pilot differs from traditional product development and requires new capabilities. To the Figure 11, I have collected the different capabilities and inputs organizations use to make the piloting faster and more suitable for digital solutions. Implementation of digital pilots combine the business knowledge organization has and the methods for agile piloting. Part of the methods are similar than in previous IT and software development and organizations already have them but part of them are totally new to the organizations and new knowledge and capabilities are needed either as external partners or as new workforce. Business knowledge and capabilities are used to address the opportunity to the organization's requirements. As a difference to the traditional product development also customers are engaged to the development more strongly and earlier than before to make the solutions interesting also for them. With the help of these four inputs, organizations aim for faster and more agile piloting which can lead to better and faster adaptation.

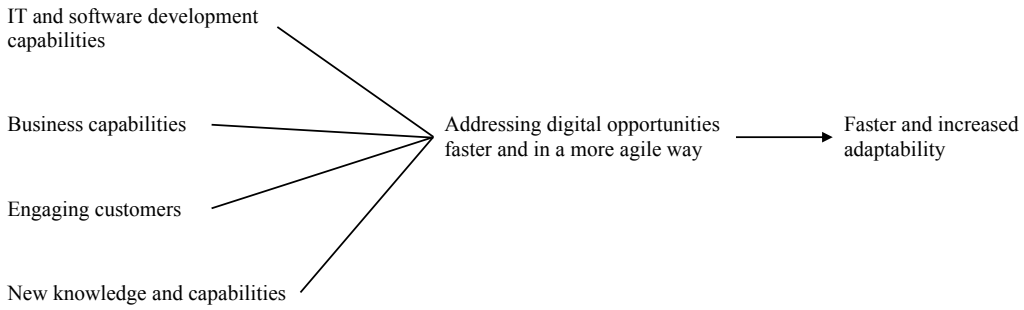

Figure 11: Sources of capabilities and inputs to support piloting of digital solutions

4.4 Changing organization to create new capabilities and adaptability

Organizations felt that adapting to the digitalization create need to change several aspects in their organization. In this section, I will first present how organizations see their current situation and need for change. Then I will discuss about the themes and dimensions in the data structure in Figure 12. First, I will discuss about organizational culture and emotions relating to digitalization. Then I will present the findings about organizational structure, external partners, centralized versus decentralized budgeting, new capabilities and

technologies, data, and lastly about competitive advantage from transforming the organization.

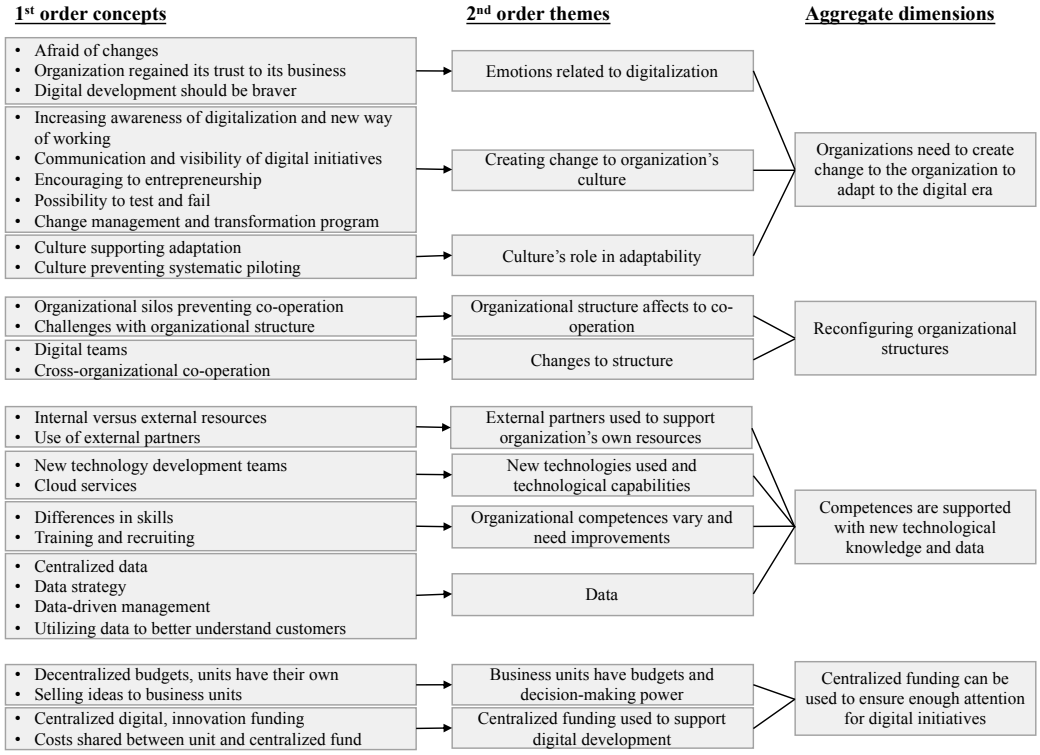

Figure 12: Data structure for changing organizations to create new capabilities and adaptability

4.4.1 View of organizations current situation and need for changes

Organizations have noticed the need to change their organizations in order to be digitally capable for the current competition and customer needs. Six out of eleven organizations had felt during the last two years that large changes are needed to make themselves digitally more capable and one believed that extremely large changes are needed, see Appendix 3. This suggests that interviewees believe that answering to digitalization is something which requires changing themselves and supports the idea behind this research that organizations need to adapt. However, all of the organizations felt that their digital capabilities would be at least on the same level as their leading competitors which shows that the organizations in this study are doing at least as well as their competitors in preparing themselves to digitalization.

Three of the organizations evaluated that they would be more advanced in digital capabilities than their competitors but in the last two years they would have noticed a need for large changes. One reason for that the more digitally advanced players felt a need for large changes could be that they have already done a lot of changes during the past two years. Another possibility could be that as being more digitally capable, they are also more aware of the possibilities they have and thus feel a need to change. However, there are several possible explanations for these answers but at least we can see that the organizations have noticed the need for change.

Based on the interviews, changes made to the organizations include, for example, changes in organizational culture, structure, capabilities and IT systems. In addition to the large changes done to organizations, also small changes are continuously done, *"this is constant renewing and developing. There is always some bottleneck which needs to be solved"* (Organization J). Small changes help organizations to fine-tune their operations and support adapting to changes.

4.4.2 Organizational culture and emotions relating to digitalization

Digitalization had created emotions in the organizations, for example, fear or despair of the future of the business. Fear was caused by the risk of losing jobs or customers, *"it creates fear in several who has done this long time that what is their value at the job market any more"* (Organization I). However, the risk of negative emotions was recognized and tried to prevent, *"on the other hand we do not want to scare people. So, there would not be an atmosphere that this could become some knowledge problem"* (Organization K). In one of the most disrupted industries, digitalization and disruption of the industry had at first created a feeling that the business would not have any future, *"a couple of years ago there could have been more doomsday feeling that you cannot make business from this. But you can make business from this"* (Organization H). Organization H had created more hope to the organization and trust to the business by good results and clearly showing the strategy for the future, *"we started to get financial figures to better shape so that brings transparency to people that hey in this digital world there is light in the end of the tunnel. It has had a huge meaning that people believe that we really have*

transparency. - - through strategy we have made visible where we are going and how the world starts to look and where we invest". Getting the organization's trust to its own business and seeing digitalization as an opportunity instead of a threat is extremely important for organization to adapt digitalization and its changes. If the organization is afraid of new opportunities, it cannot adapt to them and will not eventually be able to follow the development in technology and competition.

Better utilization of digitalization was supported by increasing awareness and understanding of digitalization in the organization. One way to increase awareness of the digital initiatives in the organization was to name them as a must-win-battle in the organization. Another way has been to increase communication and visibility of digitalization in the organization with the help of examples and success stories as Organization C has done,

"in the beginning we started this program really big. Our CEO has been all the time part of this as a spokesperson. We have done a lot of big events, open to the whole organization (name removed). In the beginning we only spoke about examples, external examples; what this could be, what this is in somewhere else, what changes have happened in specific businesses. Then we started when we got first activities inside forward, there were of course already those, so then we kind of collected them and boosted them to become faster. Then we started to present those examples that this has been done here and look could this kind of thing be suitable for your business."

With the help of success stories and visibility in the organization, organizations can engage more people to the digital transformation and also get business units' interest towards it. The interest of business units to digitalization is important since they have the resources and understanding of the business and thus they are in the long-term the ones who are responsible of implementing and adapting the strategy.

Organizational culture was seen as an enabler in adapting digital strategy. For example, in Organization J, the employees on their own initiative followed technology trends and developed themselves, *"they take some Friday pizzas and watch some latest videos online relating to some technology or something"*. Overall the culture in Organization J had become accustomed to changes, *"it could be seen as terrible problem that there is*

constant change, but I believe we are used to live in the middle of it". In addition, in some organization culture which encouraged to entrepreneurship was supported, *"we try a lot to give good feedback that encourages atmosphere that try things and then come to talk us when you invent something nice"* (Organization A). Interviewee from Organization A also saw that organizational culture was one of the keys to adapt to environmental changes,

"digital transformation is important but even more important is that organization has good values and good culture, type of development minded and common ambition is able to be created, best people is able to be attracted to work. Then anything can happen. Digital disruption can happen or some you know environmental, economic problem or environmental problem or anything. Or the industry can change but organization knows how to react."

The role of culture in adaptation presents well how adapting to changes in environment is not only about technology but about how the organization and people in it work and think. Thus, developing the organization and its culture is extremely significant.

On the other hand, in Organization H the culture prevented systematic way of addressing new digital opportunities, *"in here systematic is not in the culture. - - it has been in here that let all the flowers bloom - - we might not do digital development in the most optimal way. That under agile there is as many ways as doers probably"*. Also, the way employees in the organization think about themselves, organization and their roles can affect to the digital transformation and should change,

"I believe this has been a change in way of thinking and if we consider that here are people that has been employed only here for 30 years. - - they believe this organization (name removed) is the best in the world, knows everything well and so on. Then when you know that the world goes totally in somewhere else. So, this competence challenge and also Napoleon-complex exists. - - Previously you have managed with your eyes partly folded. Let's do this and not much interested. Now when all the industries and function lines are mixed you should also think more broadly. If you cannot do it, you do things quite badly for the firm" (Organization I).

As mentioned by the interviewee from Organization I, not being able to change the way of thinking and look more broadly can harm the organization. Digital initiatives require co-operation across the organization, different way of thinking about product development, and looking about the world and the business more broadly. The need to change culture and the way of thinking and working has been notices in organizations and the learning is supported by e.g. organizing hackathons and moving to open office without own rooms or defined desks to enable more communication across function lines.

4.4.3 Organizational structure to support digital capabilities

Digital transformation requires co-operation across the organization since digitalization affects everything: both end customer products and internal processes. Thus, organizations have tried to increase co-operation with structural changes such as creation of digital teams or boards that were already discussed in section 4.1.2. Organizations also try to move away from silos since they can harm customer-driven digital development and co-operation, *"functional organization is a really big problem when we want to build flexible, end user-driven services that I believe is the core of digitalization"* (Organization A). Some had transformed their organization to work in matrix to remove excess spending on support functions but organizing and thinking differently is complicated to implement.

Organization J had created a tribe structure to its organization in order to collect together employees who are interested of the same things, e.g. of the same technology, and to discuss and share their ideas regularly. Tribes have a leader and they can organize their meetings and events as they wish, *"they have a few hundred euros that they can use per meeting so they can go play darts or go some escape room - - but on the other end there are those that meet for example every Friday".* Organization J sees that the tribe structure strongly supports their knowledge management and learning that might have enabled their fast growth. Tribe or any other structure which encourages employees to discuss together and develop their knowledge can be useful in adapting to the changes in business environment. However, all of the employees might not be ready and interested of this type of information sharing and activities.

Organization K had combined IT department and R&D department to ensure that R&D would not concentrate too strongly only on the development of traditional products. This way the co-operation between R&D and IT would become stronger and the organization could answer to the current market situation and customer needs better

4.4.4 Use of external partners

Organizations used external partners in all of the phases to develop digital strategy: in following changes, piloting, and to bring new resources to the organization. External partners were used to bring the knowledge organization was lacking or to scale up resources, *"app development which is visible to customer is done mainly externally since the experts are quite specific and it is also expertise we do not need all the time"* (Organization K). One way to use external resources in projects was to collect a project team with internal and external personnel. It was also hoped that internal employees would learn new knowledge from externals. It was possible that one project would include several different partners. Doing continuously co-operation with external partners require new competences from organizations. Organization K had tried to solve this by establishing a new team to concentrate on it, *"there is a partnership team under Chief Technology Officer that particularly deals co-operation with start-ups"*.

Even though it was widely seen that external partners are useful in digital initiatives and they were widely used, Organization H felt that part of the digital operations should be insourced, *"until now we have sourced quite a lot but now we have recognized that it is definitely that kind of knowledge what we want to keep at least to some extent like the core in-house. Then you can source, complement it"*. Seeing the digital solutions as a core part of business shows that the business and organization have digitally transformed. Insourcing the development of, for example, mobile application or platforms bring more control to the product and its future. It also brings the data in-house which can support the business development.

4.4.5 New capabilities and technologies

To transform the organization to be more digitally capable, organizations have recruited new workforce and created teams with new capabilities. Organizations have invested especially to service design since it, for example, affects to their customer experience, *"we have also invested in service design quite a lot. We have 90 service designers so it is quite a number"* (Organization F). Few organizations had also invested in artificial intelligence and virtual reality teams. Investing in new technological capabilities and service design shows that organizations want to have the knowledge of newest opportunities themselves and do not want to rely on external partners. This means that they see these capabilities important to their business and technologies already so mature that they should have the knowledge themselves.

One of the biggest challenges when considering digital capabilities and transforming the organization is the difference in skills inside the organization. Part of the employees are really familiar with new technologies and new agile way of developing solutions, but the rest do not know how to use them and might even resist the change, *"here we have a really wide scale (of people) - - truly in the other end we have those that can create and do and absorb everything and they are world class doers. There is actually nothing to do with them, no need for centralized digital strategy - - but then we have a lot of those who just refuse to change"* (Organization A). Organizations have tried to solve this problem for instance with trainings or "soft leadership", *"here we react quite softly and people are not forced. We do something else, so we try more with positive that we praise and encourage those that move to these new ways of working and hope that it becomes a good example"* (Organization A).

Organizations have also moved to cloud-based services to support more flexible way of working that is expected by employees. Cloud services provide employees access to the materials at anytime and anywhere which is nowadays expected since the way how everyday work is done has changed. Cloud services also provide easier co-operation inside the organization and across the teams which supports well the digital initiatives which require cross-organizational co-operation and faster processes.

4.4.6 Utilizing data to support operations

The meaning of data for the business was seen important. Data of customers was centralized in some organizations to ensure better data quality. Centralized, higher-quality data provides more use cases of the data and better understanding of customers. In addition, the tools and ways to analyze data were mentioned to be harmonized to get economies of scale, *"here we can notice that it could be possible to get more economies of scale if there would be some specific certificates or ways of working a little standardized or definitions of data"* (Organization K).

All in all, organizations felt that they should use data to support their operations or they should be more data-drive. Some organizations had created data strategies to support better use of data and digitalization. Data was used to understand customers better, manage the organization, develop business and find new concentration areas, and show live data of sales and performance. Data was seen to support better offering to customers and thus bring new value, *"we already have several initiatives where we aim to use data analytics and machine learning so that our services would be kind of smarter than before"* (Organization F). Data was seen as a good way to prioritize what is done in the organization since it can be more accurate than intuition*, "we try to turn this organization to be managed with data. So, it would not be intuition. Data do not lie"* (Organization I).

Organizations invested in improving the quality of data to enabled better information and more customized connection with customers. Organization I felt that the high-quality data it has brings competitive advantage compared to competitors. Organization I believed that building similar data capabilities would take a couple of years from competitors. In addition to competitive advantage, using data well can also support adaptation to the environment since it can support different phases of the adaptation process. Data can support noticing changes in the environment, prioritizing different initiatives, measuring pilots, understanding of organization's current situation, and managing the organization.

4.4.7 Centralized versus decentralized funding

In several organizations different business units were quite independent and had their own budgets for all of the operations including digital strategy and development. This hindered adaptation to the changes and slowed down new digital initiatives since the new initiatives could not be decided centrally. Thus, teams responsible of digital strategy needs to sell the new initiatives to the business units, *"we cannot say here that now this came. We have to always sell the idea first and thus it is a very long cycle - - basically now we start to think what the topics could be which we could have next year"* (Organization I).

When the responsibility of digital strategy development is decentralized to the business units there is a risk that while they are running their normal businesses they do not see it important and urgent enough to invest in digital initiatives which are not desperately needed today but would be needed in near future. Thus, organizations do part of the financing and initiatives relating to digital centrally, *"we have done a lot of things which would have never be born in the business units - - it is not large enough problem to one business unit but it can be for all"* (Organization I). Especially the centralized funding of digital initiatives can help in organizations which are still in the middle of digital transformation to give enough resources and attention to digital initiatives, *"one big thing for us now is building innovation-fund because it is that if you have a five billion business to run, your focus is on how you sell this and next week and not that whether you are relevant in two years"* (Organization I). Funding can also be done partly centralized and partly by business units as Organization C does.

4.4.8 Competitive advantage from transforming the organization

Views of whether the changes done to the organization would bring competitive advantage to the organization or not differed. Part of the organizations said that they tried to improve their digital capabilities to get competitive advantage, *"we have done quite strong decision that we would have the best web and mobile services to use"* (Organization F). Part of the organizations saw that they got advantage by being ahead of competitors, *"our data quality is so special. It has been taken so far so we have a head start of couple of years"* (Organization I). Another reason to be ahead of competitors can

be a large and time-consuming implementation of digital solution to business units that has been made as Organization B had done. Organization A saw that they got advantage from more holistic strategy, and source of advantage which cannot be copied is their culture and values.

However, all of the organizations did not see that they would have got competitive advantage from transforming the organization. Some saw that the changes made were necessities and they would have got disadvantage if they had not done them, *"I would say it is almost all a necessity in our industry. When I look at the competitors, all are doing it and customers clearly want it"* (Organization G). But then Organization D felt that the changes maybe could bring advantage in the future, but they do not bring it yet at least, *"do we do something which is really... so we do not do just the same that our… of course with little different applications and different but basically we just stay on the same line with others or can we make something truly different. There are possibilities, but I cannot say that in my opinion it would already do it"*.

4.4.9 Conclusion of how organizations have changed themselves

In Table 7, I summarize what kind of ways relating to organizational culture, structure, digital competencies, and funding organizations have done to increase their organizations' digital capabilities and adaptability. Also, interviewees' own view of have they achieved competitive advantage because of the changes they have made to increase digital capabilities is presented. The table presents well that the ways organizations have used to ensure coping in the digital world differ but often include actions to transform the culture and creating a team to increase co-operation across the organization. In addition, recruiting and training new technological capabilities are widely used. Even though the changes and actions made would have not brought clear competitive advantage to organizations, they have ensured that organizations stay in the competition and thus are necessary to everyone.

Organization	Ways to transform organizational culture	Changes to organizational structure	Ways to build digital competencies	Centralized vs. decentralized funding	View of potential competitive advantage
A	Soft management	Aiming away from organizational silos, digital strategy team	Encouraging everyone to develop themselves	Partly centralized funding	More holistic strategy and culture brings advantage
B	No information	Digital employee resources increased and centralized	Recruited new employees with digital development skills	Decentralized funding	Advantage by being ahead of competitors
C	Digitalization visible and increasing awareness with the CEO's support and examples, culture changed towards more experimenting, encouraging to co-operation and open culture	Digital strategy team and a team to support digitalization, governance board with digital representatives to better manage scattered digital resources	Created data knowledge center, VR development and recruited employees with new type of knowledge, enforced use of external partners	Funding shared between centralized fund and business units	Advantage from recruiting and building new capabilities
D	Changing attitude towards product development, changed sales incentives to encourage sales of digital products	Digital team with representatives across organization, persons responsible of digital in product segments	Created digital solutions team with knowledge of agile development methodology	No information	Not yet competitive advantage but there is potential
E	More flexible working culture and faster decision-making	Changes to structure to clear the roles of developing and maintaining digital solutions	Meaning of your own infrastructure decreased and thus changes in roles	Business units own budgets	Disadvantage from not doing
F	Agility, speed and failing fast have been increased in the culture, afraid that changes in culture can lead to rushing	No information	Training, recruiting and use of external services, created a unit for service design	No information	New capabilities created in belief they would bring advantage
G	Increasing awareness of digitalization by an unit at a time, increased co-operation across organization	Created an unit to help other independent business units in digitalization	Increased software development and service design capabilities	Business units own budgets	Necessity to react to digitalization but working better as an organization
H	Transparency of results and clear presentation of digital path to bring trust, bringing live sales data visible	Digital team with representatives across organization to remove working in silos	Insourced and invested in capabilities e.g. service design, developers, and data architects, removing some tasks	Business units own budgets	Aim to get synergies from co-operation inside wide product offering
I	Increasing co-operation and customer-driven thinking, hackathons to change thinking	New team to support digital strategy, kept new competences in the same unit, moved to matrix organization	Using a lot of external partners, recruiting, organized trainings to learn new skills	Creating centralized fund for innovations	Data quality and customer-driven thinking bring advantage
J	No official processes and employees have freedom to fulfil themselves	Tribe structure to encourage sharing information and knowledge	Recruiting but organization already has high digital capabilities	Income funding for pilots	Tribe structure brings advantage
K	Recognized that different culture needed for digital but no specific actions mentioned	Combined R&D and IT to the same unit	External partners, trainings, created a service design team	No information	Advantage compared to what organization itself has done earlier

Table 7: Summary of ways to transform organization and increase adaptability in case organizations

4.5 Conclusion of findings

The findings of the research conducted for this thesis provide answer to the main research question and all of the sub-questions of this study. The findings present that to adapt digital strategies, organizations change the way the digital is discussed in the organization's strategy to better suit for organization's needs. In addition, organizations have created new capabilities for following relevant changes in environment, addressing new opportunities, and changing the organization to adapt to fast changes in the business environment.

Based on the findings, digitalization shows in organizations' strategies in different ways and develops through three different steps: as mentioned in strategy, digital strategy or transformation program, or embedded in business strategy. When digital strategy was specified to its own strategy, it was often used to transform the organization and was supported by a digital strategy team. When digitalization was embedded in the business strategy, it was seen as part of normal business and the responsibility of digitalization was given to all business units.

By including digital elements to strategy, organizations aimed to create operational efficiency with improved processes, and new value e.g. in the form of new services. Digital strategy was often renewed annually to keep it updated. Even though the strategy process was quite short, organizations also made decisions outside of the strategy process to answer to the latest changes.

To follow relevant changes in business environment, organizations often followed changes continuously and in more detail as part of their strategy process. Some organizations followed changes systematically and with the help of a specified team that ensured that the changes are followed and reviewed regularly. Using a team to follow changes provided customized information of the changes in one's own industry and ways to react to them that can be used in strategy development. Some organizations said that following changes is on everyone's responsibility as part of their normal work. However, this creates a risk that monitoring the environment does not get enough attention and resources if employees are busy with their normal jobs. There is also a risk that the

information from changes does not move forward from the employees. To collect ideas and input from employees, organizations have created idea gathering campaigns and processes that can lead to an opportunity to pilot the idea. From the idea collection processes organizations can get ideas that would not be part of their strategy otherwise. However, these idea gathering processes do not work for all organizations. Organizations also used external partners to keep up with the trends e.g. in technology. Prioritization of the ideas and opportunities was often done by evaluating strategic focus and potential value to customers. However, the ways to prioritize ideas varied widely.

Organizations thought broadly that addressing digital opportunities should differ from traditional product development. Testing and developing digital solutions should be faster and agile to answer the fast changes in business environment. Piloting processes were aimed to be faster and more agile with the help of methods such as sprints and easing the governance in the processes, e.g. by making less detailed business cases. To support piloting organizations combined IT and software capabilities, business capabilities, customer engagement and new knowledge. To measure pilots, organizations selected indicators in the beginning of the pilot which often included business figures, such as revenues and indicators relating to customers, such as number of downloads.

However, the reasons why organizations did pilots seemed to differ; some piloted to test different technological opportunities whereas for some pilots were used to start product development process of products they had decide to fully develop. Piloting of also more uncertain technologies and products brings a possibility to test more opportunities and thus adapt faster to the changes in business environment.

In the end of a pilot, the pilot was either ended or scaled up. When scaling up the pilots to real products, organizations let customers choose which product to use and changed their product offering at the phase of customers. This might have led to hybrid offerings, but organizations did not push customers to move to digital.

To create needed digital capabilities, organizations have made several different types of changes to their organizations which might have been led by the digital strategy or transformation program. Organizations have tried to affect their culture to embrace new

ways of working and digitalization by increasing awareness and presenting examples. Structural changes to organizations often included creating a digital team to increase co-operation across the organization and moving away from working in silos since digitalization affects everyone in the organization. Some organizations used centralized funding for digital initiatives to ensure enough attention to them while running the core business. For others, business units owned the budgets for developing new digital solutions which then requires that the units see the urgency for digital initiatives while running their core business. To increase organization's digital competences, recruiting, training, and external partners were used. In addition, organizations saw the use of data and developing it important for them.

5 DISCUSSION

The objective of this thesis was to study how organizations can simultaneously do their long-term digital strategy work and respond to the changes in environment and thus fill the gap in research about the digital strategy work. Since the literature of digital strategy is scarce and there is no similar research of how to develop digital strategy work in the long-run, findings of my study are partly discussed with literature of business strategy. In this chapter, my findings are first discussed with literature of digital strategy and then with literature of dynamic capabilities. When comparing my results to the previous literature, it is good to remember that the context of this study was large organizations in Finland and they were from several different industries which varied in how much digitalization has affected them. Thus, the results might differ from research concentrating only on one specific industry and are more general.

5.1 New insights to the digital strategy research

Findings of my study support well the previous research of digital strategy. My findings suggest that digital strategy is used to create transformation to the organization and to increase its digital capabilities. This in line with Matt et al. (2015) who see that digital

transformation strategy is used to transform organization's processes, products, and structural aspects. On the other hand, my findings suggest that organizations aim to embed digitalization in their business strategy that is also presented by Bharadwaj et al. (2013). Bharadwaj et al. (2013) see that IT strategy should be integrated to business strategy to form a digital business strategy. My findings extend the previous views of digital strategy by presenting that digital transformation strategy is a step before moving to digital business strategy. My findings suggest that organizations go through a digital transformation program to improve their maturity and capabilities relating to digital. To ensure efficient integration of digitalization to the business strategy, also changes in culture and way of working are needed that can be difficult to achieve by moving straightly from IT strategy to digital business strategy. Thus, also the way how organization discusses about digitalization in its strategy adapts as organization and the external expectations develop. In addition, my findings differ from previous research by seeing that digital strategy and digital transformation strategy is the same thing which have two different names whereas previous research discussed about either digital strategy or digital transformation strategy as they would be different things.

My findings extend on the responsibility of digital strategy work. Previous research presents that digitalization affects to all functional areas and functional silos should be removed (Bharadwaj et al., 2013; Kane et al., 2016) that is also supported by my research. Digitalization affects the whole organization and thus co-operation and whole organization's engagement should be increased. Kane et al. (2016) present that cross-functional teams can support collaboration that was also used by the organizations I studied, for example, in the form of teams with digital representatives across the organization.

My findings extend on the research of digital strategy and present that the responsibility of digitalization changes as the digital strategy develops. The result is significant since it provides information of the development of digital strategy work that the previous research does not discuss. According to my findings, centralized digital strategy teams are used during the digital transformation phase whereas the responsibility of digital strategy implementation moves to the business units when the digital is integrated to

business strategy. By having the responsibility of digitalization on business units, organizations can increase the whole organization's engagement to digitalization and make digital stronger part of the business strategy. Although, centralized digital strategy team has an important role during the digital transformation to ensure that implementation of digital strategy gets enough attention from the organization's core business and investments relating to it.

My findings about the goals of digital strategy are in line with the previous research. With digitalization, organizations aim to create operational efficiency and new differential value. In addition, customer-driven thinking and considering customers in following changes and addressing opportunities were strongly present. Based on the previous research, I did a conclusion that organization should aim to move from operational efficiency strategy to digital innovations strategy. My research suggested that one of the concentration areas during the digital transformation was to digitize processes and improve foundations for future digitalization, so organizations could concentrate already more on new services when they move to the next step in which digitalization is business as usual. That supports the idea of moving from operational efficiency strategy to new value. In addition, most of the organizations were trying to both improve efficiency and create new value which suggests that organizations have both of the concentration areas instead of choosing only one of them.

Organizations also aimed to improve their understanding of customers with data and create new digital channels to be in contact with customers. Similar type of customer-driven thinking is also seen focal in the view from Sebastian et al. (2017) about customer engagement strategy that aims to build customer loyalty and trust by providing better services enabled by digital solutions and data.

Kane et al. (2016) emphasize digital congruence which means the alignment of culture, people, structure, and tasks in order to succeed in digital transformation, learning and adaptation. Even though my results did not highlight the alignment of these dimensions, all of them were present in my findings. My findings, for example, agree with Kane et al. (2016) about organizing tasks across functional silos and building strong relationships

with external partners to increase the capabilities organization has. Whereas to improve culture, new ways of thinking and doing should be embraced to do pilot projects instead or large projects and organization should be able to fail to learn. One aspect which could be added to the model from Kane et al. (2016) to improve learning and adaptation is data. Organizations used data to understand customers better, improve their operations, and manage the organization. Data was also used to support measuring ideas and pilots. Hence, it can have an important role in organization's operations and adaptation to the changes. Data and its quality differ widely between organizations and they require alignment to organization's other actions to be beneficial. The ones that can manage data well can get competitive advantage.

Literature of digital strategy does not widely discuss about how the strategy process of digital strategy should be done. The speed of digital strategy and doing things faster than with traditional business is emphasized as one of the key themes in digital business strategy (Bharadwaj et al., 2013) that is also supported by my results. My findings present that organizations want to increase speed in their digital initiatives to ensure following the changes in environment. Also, digital strategy is often updated annually due to the fast changes even though the business strategy would not be updated.

When considering my findings relating to digital strategy, it is good to notice the limitations of my study. My study included individual interviewees of several organizations instead of studying in more detail only a few organizations. Thus, the interpretations of the data are done by looking common ways of working and assuming that quite similar way of digital strategy making can be used in different industries. In addition, the findings about the development of digital strategy are created by analyzing interviewees description of past or future goals instead of following organizations' development for a longer time.

5.2 Dynamic capabilities from digital strategy perspective

My research extends on the previous research by looking dynamic capabilities from the perspective of digital strategy and digital initiatives. My findings suggest that

organizations feel that the changes in environment are becoming faster and organizations have the need for dynamic capabilities. My findings also present that the dynamic capabilities required for digital strategy differ from the dynamic capabilities organizations have used with business strategy. Next, I will discuss more closely about the findings of the three different capabilities. When going through my findings, it is good to notice that I am comparing my research mostly to the general literature of dynamic capabilities and not digital strategy specific since it is scarce. Thus, my discussion mainly presents what my findings can add to the previous research instead of validating the results.

5.2.1 Sensing

My research extents on previous research by looking at how systematically sensing is done. My findings present that the role of strategy making is important in sensing and assessing the changes in environment which has not been emphasized in the previous literature. During the process of making a new strategy, the changes in environment and expectations for future were studied in detail. Due to the fast changes relating to digital strategy, sensing was also done continuously outside of the strategy making process to react to the fast changes even though the digital strategy was often revised annually.

My findings suggest that the sensing related to digital strategy is also expanded outside one's own industry to see what the latest trends and technologies are. Previous research emphasize more that sensing should be done by looking at different phases in time, the past, the present and the future (Day & Schoemaker, 2016) but not across industry borders. The reason why looking beyond your own industry is significant with digital strategies is the fast changes in technologies which can spread across industries. Also, the disruptive competitor can come from some other industry that increase the need to follow other industries (Downes & Nunes, 2013). However, looking outside of one's own industry can weaken the use of cognitive capabilities and intuition in sensing. Previous research shows that organizations use their prior knowledge to see patterns and to "connect the dots" (Baron & Ensley, 2006; Gregoire et al., 2010; Hodgkinson & Healey, 2011) and that can be more difficult when following industries of which you are not

familiar with. That could partly support my finding of using external partners and ecosystems to support sensing. In addition to using external partners such as Gartner to bring latest information of changes in technology, co-operation is done between organizations in different industries to share experiences of new technologies. Finding potential collaborators in innovation activity in organization's business ecosystem is supported by Teece (2007). One external partner used in sensing was start-ups since organizations thought that new innovations will be created outside of their organization and co-operation with start-ups will keep them informed of the newest developments in technology.

My findings support the need to collect information from the individual employees in the organization which is in line with the view of Day & Schoemaker (2016) saying that senior managers in the organization should be given ways to speak. However, what is surprising is that my findings take engaging employees in the organization even further by saying that the employees with an idea should be given also an opportunity to test and prove the idea. This might be easier to do with digital ideas than traditional product development since digital solutions can be faster and cheaper to develop. In addition, digital solutions can be developed only to the minimum level whereas traditional products need often to be fully developed. Thus, giving the opportunity for teams to test their ideas can be something which is more suitable for digital initiatives than traditional product development.

My research extends on the previous literature by seeing that a specified team can support sensing. Team responsible of following changes often have cognitive skills such as a good previous knowledge of their industry and customers, and intuition which were emphasized in the previous research. However, the benefit of the team is that they have resources to sense systematically and position to consider how to respond to changes. Thus, they can help develop organization's strategy.

Previous research did not widely discuss how prioritization of ideas should be done. Teece (2007) presents that organizations' articulated strategy selects to which opportunities the organization concentrates. Results of my study support the use of

strategic focus in selecting which concentrate. However, I would say that organizations should be cautious when prioritizing opportunities mainly based on their strategy. Disruptions are getting harder to predict as Downes & Nunes (2013) explained and thus organizations should be able to look beyond their current strategic focus to see if the detected change could be meaningful for them.

5.2.2 Seizing

My findings present that organizations have capabilities which resemble seizing when addressing new opportunities relating to their digital strategies. One of the main actions organizations do to address new opportunities is piloting new solutions. In seizing, organizations choose when, where, and how much to invest and the specific business models (Teece, 2007). When organizations do pilots, they also make those decisions about their investments. However, what is different and surprising in piloting of digital solutions is that the results of the pilot are more uncertain than with traditional products and thus organizations need sometimes to redesign the business model and investment plans after the pilot. Thus, the decisions relating to the product design, investments, and the business model are partly done after the piloting and not in the beginning of the process of addressing new opportunities.

My findings build on to the previous research of seizing by presenting that organizations aim to do seizing of digital opportunities faster than with traditional products. Faster processes are needed to ensure staying in the competition and to ensure that the developed technology will not get outdated during the development process. In addition, organizations aim to work in an agile way and they have taken new methods to the business development. To react faster and more agile, organizations combine their business capabilities, IT and software capabilities, customers and new knowledge to the development process. By bringing together agile development methods, technological knowledge, customers' views, and organization's own expertise of their business, organization can respond fast but correctly to the changes in environment. Previous literature also suggested getting new skills and resources for digital innovations without

making all existing skills obsolete or hurting existing product innovation processes (Nylén & Holmström, 2015; Svahn et al., 2017). Balancing between new and old skills was also noticed in my findings and organizations trained their employees to embrace new ways of working.

One of the reasons to change the way of addressing new opportunities can be the new characteristics of digital innovations. Yoo et al. (2012) have identified three traits of innovations to react for the characteristics: the significant meaning of digital platforms, the emergence of distributed innovations, and the commonness of combinatorial innovations. The use of digital platforms was visible in my results in the way that organizations saw that developing applications with the help of platforms is more efficient and brings synergies for them. My findings supported the emergence of distributed innovations in that sense that the responsibility of development and funding was given to the business units in some organizations. Lastly, the third trait of digital innovations is also visible in my study since organizations had notices that digital innovations require different type of thinking and financing due to their combinatorial nature. Organizations had noticed that digital initiatives require more courage and trust and that the solutions cannot be planned comprehensively. Instead the solutions can be altered and developed on the go that supports the idea of improvisation in innovations from Nylén & Holmström (2015).

Another difference between seizing of traditional and digital opportunities is that aim to do more pilots and fail fast with the unpromising ones. My findings suggest that organizations see that pilots relating to digital initiatives can be done faster and with costs that easily embed in budgets which makes it possible to do more of them. The view that addressing new opportunities can be done with low costs is contradictory to Teece's (2007) view that seizing might require high-investments. In addition, organizations see that all of the pilots do not have to lead to full products and can be unsuccessful that the goal to fail fast suggests. Failing fast is in line with the view from Day & Schoemaker (2016) who see that organizations should use probe-and-learn approach and do several smaller initiatives since it can help to balance the risk and reward. However, doing a lot of pilots with the idea that part of them fail can be hard due to the organizational culture,

as my findings suggest, or risk avoidance (Teece, 2007). Thus, my results suggest that to seize successfully organizations should also have the right attitude about testing new opportunities instead of only organizing the processes effectively.

My research extends on the previous research also by looking at how digital initiatives are measured. One significant thing about measuring digital experiments and product development is that it differs from the measuring organizations do for traditional products. The indicators are often similar than with traditional products, such as business case or customer related indicators, but the investment calculations and the measuring are made lighter than with more traditional product development. The reason for that is to make the project governance lighter and hence make smaller and faster piloting projects possible. In addition, measuring of pilots is used to support learning from pilots and to follow the progress, for example, with gate review.

My findings suggest that organizations launch and scale up new digital solutions at the phase of customers. That means that organizations can offer analogical and digital products to their customers at the same time and sometimes even in hybrid offerings. Scaling up at the phase of customers presents well organizations' aim to be customer-driven in digital development. However, the previous literature showed that the seizing can be negatively affected by biases and emotions because the new opportunities can change or weaken the current business (Hodgkinson & Healey, 2011; Teece, 2007). Even though my results suggested that digital transformation can create fear and resistance to change, it was surprising that interviewees did not discuss about organizations' resistance to offer digital solution instead of traditional products or their internal customers' resistance to move to digital products. Nevertheless, based on my findings I would not say that there would not be biases or negative emotions between a new opportunity and the current business because it might be a subject which interviewees did not want to mention or have not noticed.

However, when looking at the capabilities organizations have for seizing, part of them are not dynamic capabilities but merely ordinary capabilities. Dynamic capabilities are inimitable signature processes in which the priority is about doing the right things (Teece,

2014). Whereas, the processes and best practices copied from other organizations are often ordinary capabilities (Teece, 2014). Thus, as part of the case organizations were still developing their processes or had copied some ready-made development methodology from others, their capabilities are not yet specific for the organization or dynamic capabilities.

5.2.3 Reconfiguring

Decentralization and near decomposability suggested by Teece (2007) is in line with my results but contrary to previous research, my results suggest that the level of centralization can vary based on organization's digital maturity. Those organizations to which digital strategy is already part of the business strategy, do strategy work relating to digital strategy decentralized. Whereas the organizations which are still going through digital transformation often lead the transformation and strategy work relating to digitalization centralized. This suggests that organizations aim towards decentralization and giving the responsibility closer to the everyday business as Teece (2007) suggests. However, co-operation across the organization was valued as part of digital strategy work and the organizations with decentralized digital strategy making could also have cross-organizational teams to support digital strategy work.

My findings also present that organizations differed in how they arrange funding, and some used centralized funding to ensure that digital initiatives get enough attention from the current business. Organizing centralized funding is partly in line with Day & Schoemaker (2016) who say that funding should be separated to ensure that losses from the initiatives are not carried by an established business unit and with Teece (2007) who present that the managers of the current business can prevent new opportunities getting financing if new opportunities are not suitable for them. Separating funding suggested by Day & Schoemaker (2016) does not mean that it should be centralized but centralizing funding ensures that also organization wide initiatives get enough attention. At the same time, my results present that part of the organizations did funding of digital initiatives decentralized which supports Teece's (2007) view of decentralization.

Cross-organizational digital teams support knowledge transfer presented by Teece (2007) under the knowledge management. Other aspects in findings support the meaning of knowledge management as well. Organizations saw that they have large differences in skills inside the organization and a need to improve their knowledge and get new skills relating to digitalization. They used trainings and recruiting as ways to improve their capabilities. Also, new teams with new type of skills were added to the organization and part of knowledge which had been previously outsourced was now insourced and integrated to the organization. Organizations had noticed that the new type of talent such as programmers or data scientist require different kind of management and cannot be decentralized to the organization. The new talent requires possibilities to spar together and freedom to fulfill themselves to thrive. Thus, organizations need to learn new ways to do knowledge management.

One aspect which could be added to the knowledge management by Teece (2007) is managing of external partners. External partners are valuable resources for organizations and external partners of course need to be managed well to benefit from the resources and knowledge they have. For example, use of hybrid teams with internal and external resources or using several external partners in the same process can require different kind of skills and project management than before. However, at the same time, the use of external partners is partly contradictory to the theory of dynamic capabilities. Dynamic capabilities are organization's signature processes which bring competitive advantage to the organization (Teece, 2014). External partners are available also for competitors and sell their services to several firms and are not organization specific. Nevertheless, organizations can use and manage external partners better and differently than others which can be an advantage bringing dynamic capability.

My findings present that organizational culture and emotions in the organization have a significant role in the adaptation and they can prevent or enable change in the organization. Organizations need to influence the culture and emotions to make the whole organization adaptable. This supports strongly the need of good managerial cognitive skills presented by the previous literature. Especially the need of good communication skills and social cognition (Helfat & Peteraf, 2015) are in line with my findings. In

addition, Kane et al. (2016) see that the culture is significant in adapting digital strategy that is supported by my findings. Organizations were also doing semi-continuous changes to the organization which are discussed by Teece (2007) to avoid internal conflicts.

6 CONCLUSIONS

6.1 Main findings and theoretical contribution

The purpose of this study was to find out how large Finnish organizations can simultaneously do long-term digital strategy work and adapt to the fast changes in business environment. The topic is important since investing in the long-term strategy is hard and uncertain due to the fast changes in business environment and new type of disruptions. There is a risk of investing and locking-in to wrong technologies if organizations blindly follow their long-term strategy. Organizations need to adapt their digital strategy work in order to cope with the new conditions.

The previous research of digital strategy is scarce and more concentrated on creating a digital strategy than developing it in the long-term. The previous research does not explain how organizations could adapt their digital strategies to the fast-changing business environment and address new digital opportunities. Even though dynamic capabilities and also all the three capacities presented by Teece (2007) have been further researched, digital strategy and how to adapt it have not been studied from the dynamic capabilities perspective.

This thesis aims to fill the gap in the research and find out what kind of methods large organizations are using to adapt their digital strategies. In addition, it aims to see what kind of capabilities organizations have for following and responding to the fast changes in business environment and how organizations change themselves to increase their digital capabilities. For the managerial audience this study intends to bring ways to improve their digital strategy work and develop new digital solutions. To reach these objectives, the research question of the study was: *"How do large Finnish organizations adapt their digital strategies to the fast-changing business environment?"*. The research

question had also three sub-questions concentrating on the different areas of adaptation which are following relevant changes in business environment, addressing new possibilities, and changing the organization to create digital capabilities. The research concentrated on large Finnish organizations.

The findings of this thesis suggest that organizations have brought digitalization as part of their strategy with the goals to improve operational efficiency and create new value. To adapt to the changes in environment, organizations adapt the way they discuss and implement digital strategy. Digitalization is discussed in strategies in three different ways: mentioned in strategy, a transformative strategy or embedded in the business strategy. The responsibility of coordinating and implementing digital initiatives in these options differ. In digital transformation strategy, digital transformation is often led by centralized team. Whereas when digital strategy is embedded in business strategy, the responsibility of implementing digital strategy is given to business units. These different forms of digital strategy can be found from the previous literature. What my study brings to the previous research is that the digital transformative strategy is used to create capabilities and digital maturity before embedding digitalization in the strategy and giving the responsibility to the business units.

Organizations felt that digitalization and changes created by it have happened already for a longer time, but the changes are getting faster. Organizations followed changes continuously but the process to create new strategy was a significant timing to study the changes in business environment in more detail. Organizations differed in how systematically they followed the changes and how clear the responsibility to follow changes was. One reason for the large differences in the ways of following changes and evaluating them can be that moving from noticing an opportunity to addressing it is done partly unstructured way without a clear idea how to do it in the best way.

The findings of this thesis extend to the previous research by suggesting three ways to support following relevant changes as part of adapting digital strategy. My findings suggest that following changes also outside of one's own industry is significant in digital strategy and that can be supported by using external partners. External partners can

provide the organization with more refined but general information and experiences of the latest trends, especially in technology, that helps the organization to keep up with the general development. A significant part of following changes was also done by individual employees in the organization and idea collection processes can be used to collect inputs from them. With the idea collection processes organizations can get a lot of new ideas and maybe even teams to prove the ideas and those ideas might not have been part of the planned strategy. A third way to support following of changes is to use a team to systematically collect information of the changes in one's own industry. This information can be organization specific and provide ways to respond to the changes that might be used to develop strategy.

Organizations address new digital opportunities differently than in traditional product development and aim to be faster and more agile. Organizations differ in the reasons why they use pilots, and some do pilots to test new opportunities whereas others as a beginning for a product development process. In addition, part of the organizations had clear processes how to pilot but not all.

My findings suggest that piloting in organizations have three steps: planning, implementing, and ending or scaling up. The planning step includes planning the pilot, measures used in it, and how scaling up could be done. In implementation step, agile methods are used to implement the pilot and the pilot is measured to decide how to continue with it. Finally, the pilot is either ended with the goal to fail fast or scaled up depending on its performance. Scaling up of the pilot is seen important to do at the phase of customers.

I extend the previous research by presenting that in piloting of digital solutions, organizations need capabilities from four sources. Organization usually have already IT and software development capabilities and business capabilities but to those also engaging customers and new knowledge such as services design or programming are added. By combining these capabilities organizations aim to address new opportunities faster and in a more agile way. My findings also support the previous literature of digital innovations by shoving that the three traits of innovations were present when large

organizations aimed to develop new digital solutions. These traits are the significant meaning of digital platforms, the emergence of distributed innovations, and the commonness of combinatorial innovations.

Organizations had noticed the need to change themselves to be digitally more capable. One significant area which organizations tried to influence was the culture and emotions in the organization since they hinder or enable adaptation. Organizations tried to increase the awareness and understanding of digitalization and showed how the organization is planning to use digitalization that are in line with the cognitive skills discussed in previous literature of dynamic capabilities. In addition, the co-operation across the organization was seen important and was supported e.g. with digital teams.

My findings support the importance of knowledge management presented by Teece (2007). To be digitally more capable, organizations had recruited new knowledge and skills to the organizations and took new technologies into use. Organizations also tried to decrease the large differences in skills relating to digital in the organization by trainings. What my findings could add to Teece's (2007) knowledge management is the management of external partners. External partners are focal in adapting to the fast-changing digital world and thus organizations need new skills to manage the increasing number of partners.

The benefits and role of centralized funding was noticed in my research as in previous literature. Part of the organizations had created separated funds for digital initiatives to support digital strategy. With separated funds organizations can ensure that digital initiatives get enough attention from everyday business.

Overall, my findings present that large organizations have reacted to the fast-changing environment and are actively trying to adapt to it. The ways they are using to adapt are similar than in dynamic capabilities theory. However, organizations have recognized the meaning of fast actions and are trying to fasten their operations with new ways of working which were not used with traditional business. Thus, the dynamic capabilities they use with digital strategy differ from those used with traditional business.

6.2 Managerial implications

My research suggests that to be able to adapt digital strategy to the changes in business environment, organizations should first transform the organization digitally and learn new ways of working. Digital transformation is needed to increase organization's digital maturity and to concentrate the efforts to digitizing the current business. This effort should be supported by centralized team and centralized innovation funding to ensure that it gets enough attention while running the core business. The goal of the transformation should be to increase organization's digital capabilities to the level that the responsibility of the digitalization could be moved to business units and digital strategy could be integrated to business strategy. At that point, digitalization should become business as usual and the business units could concentrate on creating new value bringing digital solutions. In addition, all of the aspects of digital strategy work should be customer-driven to really benefit from digitalization.

Implementing digital strategy in any form and managing the changing environment requires co-operation across the organization and engaging the whole organization. Digital strategy work should be done everywhere in the organization instead of being only on strategy unit's agenda. To be able to do co-operation and customer-centric development, organizations should move away from silos and share information efficiently. Digital or technology teams with representatives from all units can support information flow and sharing of best practices.

Following changes should be done continuously and organizations should have the readiness to depart from strategy process when needed to ensure adaptability to changes. To ensure efficient monitoring of changes, organizations should have clear responsibilities for that. In the case that following of changes is left to the responsibility of individual employees as part of their other job, they need to be given enough time and resources to do it and an official way to report their findings. Idea collection processes or campaigns can bring a lot of new and valuable information and sometimes even a possibility to get an enthusiastic team to develop and prove the idea. However, these

processes might collect only the ideas from the most active employees and thus also some other way to report ideas which does not require commitment to the idea should be used.

Doing co-operation in an ecosystem or getting help from external partners to following changes can also support sensing. Co-operation with external partners can bring more refined information and experiences, for example, of new technologies and ease sensing. Co-operation can also become beneficial in the form of new business opportunities.

To address the new opportunities, organizations should do a larger number of pilots from which part would fail. To pilot successfully, the pilot is planned and design beforehand to support learning. Pilot needs a clear idea and meaning why it is done and what can be learned from it. In addition, indicators for the pilots should be set in the beginning of the piloting process to follow the development and offer possibilities to learn from it. Engaging customers, for example, with interviews or product tests early on to the pilots can support developing product and service models that are expected by customers and make the developing process shorter.

The speed of doing pilots can be improved by lightening governance and using agile methods to ensure faster adaptation to the changes. Part of the governance slowing down the pilot can be removed by making the required investment calculations and estimates before piloting less detailed. By giving the ownership and decision-making power of the resources to the team can remove the need to constantly getting permission for the next steps. Also, platforms and cloud services can ease adaptation by making piloting faster and bring synergies.

To support adaptation, addressing opportunities should either end to ending a pilot or scaling it up to a full product. Ending pilots fast requires organizational culture which allows failing and it could be encouraged, for example, by discussing what we could learn from failures instead of looking for the guilty ones. Scaling pilots successfully requires good planning already in the beginning of the pilot. Plans how the scaling could be done and how it integrates to our current solutions should be decided early on. To make the scaling up customer-driven and maximize customer satisfaction, moving from analogical to digital products should be done at customers' phase.

To ensure adapting digital strategy to the changes in environment, the organizational culture needs to support digitalization and the organization need to see digitalization as an opportunity and not as a threat. Change in organizational culture can be supported by increasing organization's awareness of digitalization e.g. by presenting examples and success stories from inside and outside of the organization. Also, mapping digital strategy's way forward and showing how products are going to change and transparently showing the results later on can support seeing digitalization more as an opportunity than a threat.

Nowadays, the possibilities with data have improved and data can also help detect changes, react to them, and manage the organization. That is why, investing in improving the quality of data and better tools to use it are important. Keeping the data of customers and the main operations centralized and harmonizing the way data is analyzed can support using their full potential. After the quality of data has been improved, data can be used for, for example, understanding customers better, customizing the offering for customers, improving organizations operations, and leading the organization more accurately.

6.3 Suggestion for further research

As my research indicates, organizations have dynamic capabilities and they try to adapt themselves to the changes also in digital strategy work. To understand more of what kind of capabilities organizations have to adapt their digital strategy, further research could concentrate on the individual dynamic capabilities. This could bring more detailed information of how organizations sense, seize, or reconfigure and validate the results I got. Interesting concentration areas inside the dynamic capabilities could be, such as use of ecosystems or start-ups in sensing, how to improve commercialization and scaling up digital products in seizing, or ways to improve the knowledge management in reconfiguring. All of these topics were noticed relevant in my study, but my research concentrated on all of the dynamic capabilities that did not allow studying them more deeply.

Another interesting topic would be to look at the dynamic capabilities relating to digital strategy in start-ups or firms that have grown fast and disrupted markets. These organizations do not have the same burden as large organizations and can thus operate differently. It could be interesting to see what these smaller organizations are doing and how it differs from large organizations. It could provide an interesting comparison and maybe some ideas how large organizations could improve their operations.

My study made a conclusion that digital transformation strategy is a step before integrating digital to business strategy. This conclusion could be validated by following the development of digital strategy in one or several organizations. It would provide more detailed and accurate information how digital strategy and the responsibility of it develops. It could also be interesting to do a multiple case study of organizations from which part leads digital transformation centralized and part more decentralized to see if there are differences in how the digital strategy develops and what the impacts in performance are. This could provide information whether leading digital transformation centralized is beneficial or not.

Part of the organizations I interviewed had a Chief Digital Officer in addition to Chief Information Officer. One interesting research area could be to look how operations and performance relating to digital strategy differ in organization who have both a CDO and a CIO and those which have only a CIO. Having a separate CDO emphasize that operations relating to digital is something different than traditional information technology that might affect to the way the organization sees digital strategy. As we learned from my research, the way organization sees digitalization is significant to the digital strategy. Also, having two different executives change the way responsibilities are organized and can thus affect to the performance of the organization positively or negatively.

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8 APPENDICES

Appendix 1: Interview guide

Introduction

Permission to tape the interview

What is your role and how long have you been in the organization?

Could you shortly tell what kind of components does your digital strategy include and how long have you had a digital strategy?/ Could you shortly tell how does digitalization show in your operations and strategy?

Part 1: Changes in the environment

What kind of changes have you experienced that have affected your digital strategy during last twelve months?

How have you detected these changes?

How often do you detect changes?

How do you prioritize which changes are significant opportunities or threats to your organization?

Part 2: Actions to exploit the new possibilities

After you have decided to go on with an opportunity or a threat, how do you experiment or implement it?

How do you measure the success of experiments and pilots?

How do you develop and scale up the successful experiments to full products?

How do you treat pilots compared to your already existing products and solutions?

Part 3: Changing the organization and its digital capabilities

During the last twelve months, have you noticed gaps in your organization which have harmed implementing digital strategy and new digital opportunities? What kind of gaps have they been?

What kind of changes have you done to fill these gaps and how do you prioritize these needed changes?

Do you believe you get advantage compared to competitors because of the changes you have made to your organization to react to the digitalization? Do you do something better than others or could everyone copy what you do?

Closing

Do you have any other remarks on the topic that we have not discussed yet?

Thank you for your time!

Appendix 2: Background questionnaire

Survey for Master's Thesis research

Name:

Organization:

1. Does your organization have a specified digital strategy?

1. Yes
2. No
3. I don't know

2. Does your organization have a specified team to coordinate and implement digital strategy?

1. Yes
2. No
3. I don't know

3. How many members are in this digital strategy team?

1. We don't have a team
2. 10 members or less
3. 11-30 members
4. More than 30 members
5. I don't know how many members there are

4. How would you evaluate your organization's digital capabilities compared to leading competitors?

1. Far behind
2. Lower
3. At the same level
4. More advanced
5. Superior

5. Based on your own experience, how significantly have digitalization and new digital opportunities transformed your industry?

1. Not at all

2. Slightly
3. Somewhat
4. Significantly
5. Extremely significantly

6. During the last two years, have you felt a need to change your organization to ensure that your organization is digitally capable for the current competition and customer needs?

1. Not at all
2. Small changes needed
3. Mediocre changes needed
4. Large changes needed
5. Extremely large changes needed

7. How do you see changes caused by digitalization to your organization?

1. There are no changes which are significant for us
2. Changes create mainly threats
3. Changes create threats and opportunities
4. Changes create mainly opportunities
5. Neither as threats or opportunities

8. How would you evaluate your organization's capability to adapt its digital strategy to the changes in environment (e.g. changes in technology, customer expectations, and competition)?

1. No capability
2. Low capability
3. Mediocre capability
4. High capability
5. Extremely high capability

Appendix 3: Results from background questionnaire

Organization	1. Does your organization have a specified digital strategy?	2. Does your organization have a specified team to coordinate and implement digital strategy?	3. How many members are in this digital strategy team?	4. How would you evaluate your organization's digital capabilities compared to leading competitors?	5. Based on your own experience, how significantly have digitalization and new digital opportunities transformed your industry?	6. During the last two years, have you felt a need to change your organization to ensure that your organization is digitally capable for the current competition and customer needs?	7. How do you see the changes caused by digitalization to your organization?	8. How would you evaluate your organization's capability to adapt its digital strategy to the changes in environment (e.g. changes in technology, customer expectations, and competition)?
A	Yes	Yes	10 members or less	At the same level	Somewhat	Mediocre changes needed	Changes create threats and opportunities	High capability
B	I don't know	Yes	11-30 members	More advanced	Significantly	Large changes needed	Changes create threats and opportunities	High capability
C	Yes	Yes	10 members or less	At the same level	Somewhat	Large changes needed	Changes create threats and opportunities	Mediocre capability
D	Yes	Yes	10 members or less	At the same level	Slightly	Mediocre changes needed	Changes create threats and opportunities	Mediocre capability
E	No	Yes	10 members or less	At the same level	Somewhat	Mediocre changes needed	Changes create threats and opportunities	Mediocre capability
F	No	No	We don't have a team	More advanced	Significantly	Large changes needed	Changes create threats and opportunities	Mediocre capability
G	Yes	Yes	More than 30 members	At the same level	Extremely significantly	Large changes needed	Changes create mainly opportunities	Mediocre capability
H	No	No	We don't have a team	More advanced	Extremely significantly	Large changes needed	Changes create threats and opportunities	High capability
I	Yes	Yes	10 members or less	At the same level	Significantly	Extremely large changes needed	Changes create threats and opportunities	Mediocre capability
J	No	No	We don't have a team	More advanced	Somewhat	Mediocre changes needed	Changes create threats and opportunities	Extremely high capability
K	Yes	No	We don't have a team	At the same level	Significantly	Large changes needed	Changes create threats and opportunities	High capability